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United States Department of Energy Environmental Restoration Program Management Action Process Document

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Prepared for
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PADUCAH GASEOUS DIFFUSION PLANT
Paducah, Kentucky 42002
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-76OR00001

CONTENTS

ACRONYMS

ACL	**Alternate Concentration Level**
ACO	**Administrative Consent Order**
AEC	**Atomic Energy Commission**
AIP	**Agreement in Principle**
AOC	**Area of Concern**
ARAR	**Applicable or Relevant and Appropriate Requirement**
BRA	**Baseline Risk Assessment**
CERCLA	**Comprehensive Environmental Response, Compensation, and Liability Act**
CFC	**Certified for Construction**
CM	**Construction Manager**
CMI	**Corrective Measures Implementation**
CMS	**Corrective Measure Study**
CPR	**Cost Performance Report**
CWA	**Clean Water Act**
D&D	**Decontamination and Decommissioning**
DNAPL	**Dense Nonaqueous Phase Liquid**
DNFSB	**Defense Nuclear Facility Safety Board**
DQO	**Data Quality Objective**
DOE	**U.S. Department of Energy**
ERBAM	**Environmental Restoration Benefit Assessment Matrix**
EM	**Office of Environmental Restoration and Waste Management**
Energy Systems	**Lockheed Martin Energy Systems, Inc.**
EPA	**U.S. Environmental Protection Agency**
ER	**Environmental Restoration**
ES&H	**Environmental Safety and Health**
EU	**Enriched Uranium**
FFA	**Federal Facility Agreement**
FFCA	**Federal Facility Compliance Agreement**
FFCAct	**Federal Facility Compliance Act**
FS	**Feasibility Study**
FY	**Fiscal Year**
GC	**Gas Chromatograph**
GDP	**Gaseous Diffusion Plant**
HRS	**Hazard Ranking System**
HSWA	**Hazardous Solid Waste Amendments**
IC	**Integrating Contractor**
IDW	**Investigation-Derived Waste**
KDEP	**Kentucky Department for Environmental Protection**
KDWM	**Kentucky Department of Waste Management**

KOW	**Kentucky Ordnance Works**
KPDES	**Kentucky Pollutant Discharge Elimination System**
LDR	**Land Disposal Restrictions**
LMES	**Lockheed Martin Energy Systems, Inc.**
LMUS	**Lockheed Martin Utility Services, Inc.**
LNAPL	**Light Nonaqueous Phase Liquid**
M&O	**Management and Operations**
MCL	**Maximum Contaminant Level**
MS	**Mass Spectrometer**
NAPL	**Nonaqueous Phase Liquid**
NCP	**National Contingency Plan**
NE	**Nuclear Energy**
NEPA	**National Environmental Policy Act**
NFA	**No Further Action**
NPL	**National Priorities List**
NREPC	**Natural Resources and Environmental Protection Cabinet**
NSDD	**North-South Diversion Ditch**
O&M	**Operations and Maintenance**
OR	**Oak Ridge Field Office**
OREIS	**Oak Ridge Environmental Information System**
ORO	**Oak Ridge Operations**
ORR	**Oak Ridge Reservation**
OU	**Operable Unit**
PA	**Preliminary Assessment**
PGDP	**Paducah Gaseous Diffusion Plant**
POC	**Point of Compliance**
POE	**Point of Exposure**
PRG	**Preliminary Remediation Goal**
PTS	**Progress Tracking System**
QA	**Quality Assurance**
QC	**Quality Control**
RA	**Remedial Action**
RCRA	**Resource Conservation and Recovery Act**
RD	**Remedial Design**
RFA	**RCRA Facility Assessment**
RFI	**RCRA Facility Investigation**
RGA	**Regional Gravel Aquifer**
RI	**Remedial Investigation**
ROD	**Record of Decision**
SAFER	**Streamlined Approach for Environmental Restoration**
SARA	**Superfund Amendments and Reauthorization Act of 1986**
SEMP	**Systems Engineering Management Plan**
SI	**Site Inspection**

SMP	**Site Management Plan**
S&M	**Surveillance and Maintenance**
SSAB	**Site-Specific Advisory Board**
SWMU	**Solid Waste Management Units**
Tc-99	**Technetium-99**
TCE	**Trichloroethylene/trichloroethene**
TCLP	**Toxicity Characteristics Leaching Procedure**
TI	**Technical Impracticability**
TSCA	**Toxic Substances Control Act**
TSD	**Treatment, Storage, and Disposal**
UCRS	**Upper Continental Recharge System**
UE	**Uranium Enrichment**
UF_6	**Uranium Hexafluoride**
UK-FFOU	**University of Kentucky-Federal Facility Oversight Unit**
USEC	**United States Enrichment Corporation**
UST	**Underground Storage Tank**
VE	**Value Engineering**
WAG	**Waste Area Group**
WKWMA	**West Kentucky Wildlife Management Area**

EXECUTIVE SUMMARY

The Department of Energy Paducah EM Program has completed implementation of the Management Action Plan (MAP) that was initiated by EM-40. The results of that MAP are contained in this document.

The Process is designed to assist department and contractor management and technical personnel, regulators, and stakeholders in capturing, evaluating, and documenting information essential for programming, decision making, and implementing the EM Program at Paducah. It provides a means for developing a common understanding of project status and strategy, understanding and evaluating ever-changing project requirements, identifying project improvement or optimization opportunities, setting priorities and sequencing work activities, and identifying and resolving local and strategic issues. The Process, which includes a bottom-up review of all past and ongoing EM Program activities at Paducah, provides a dynamic approach to developing effective EM strategies and resolving all environmental technical, operational, and administrative issues so that environmental actions can be effectively and expeditiously completed.

It is important to note that the MAP Project Team is identical to the Site Management Plan (SMP) Team. Participants have met extensively on the SMP, program deliverables, prioritization, and scheduling. All of the information in the SMP is included in the MAP along with the next level of detail and information on Waste Management activities. This Document is a result of the Process which has actually been utilized throughout the development of the SMP and incorporates recommendations developed therein. It represents a concise "snapshot" of the Paducah EM Program and includes a summary of past accomplishments; status of the Paducah EM Program, and future strategy, rationale, schedule, and funding requirements necessary to meet program objectives. As a snapshot, it is important to note that the Paducah EM Program is in transition, moving from a contracting approach that was basically level of effort to an aggressive incentive task order approach. Goals have been established to move 30 percent of the EM Program projects to incentive task orders by fiscal year (FY) 1996 and 60 percent by FY 1997. Since incentive contracting will soon dominate the conduct of EM projects at Paducah, this MAP focuses on and discusses how business is/will be conducted under that approach rather than the current level of effort model which is being phased out.

This Document is a single, consolidated document that identifies the Paducah EM Program's strategic course of action for restoration. Like the Process itself, this Document is dynamic and will be updated annually.

1. INTRODUCTION

A critical mission of DOE is the planning, implementation, and completion of EM programs at operating and inactive Department facilities. An integral part of this mission is the safe and cost-effective environmental restoration of PGDP, located near Paducah, Kentucky. The Enrichment Facilities' portion of the program includes, but is not limited to, the cylinder program, nonleased and non-D&D facilities, road and grounds upkeep, and a large-scale declassification project. The term "EM Program" used throughout this document will refer to ER and Waste Management. Both ER and Waste Management receive EU funding through EM-40; whereas, Enrichment Facilities is NE funded. Since the MAP Document and Process is an EM-40 initiative, the Enrichment Facilities' portion of Paducah's program which does not receive funding through EM-40 will not be discussed further unless directly related to the EM Program activities at the site.

This Document summarizes the accomplishments and status of the Paducah EM Program and presents a comprehensive strategy for remediation and management of contaminated environmental media and the decommissioning of facilities and structures.

1.1 PURPOSE OF MANAGEMENT ACTION PROCESS

The Process is designed to assist DOE and contractor management and technical personnel, regulators, and stakeholders in capturing, evaluating, and documenting information essential for programming, decision making, and implementing the EM Program at Paducah. It provides a means for developing a common understanding of project status and strategy, understanding and evaluating ever-changing project requirements, identifying project improvement or optimization opportunities, setting priorities and sequencing work activities, and identifying and resolving local and strategic issues. The Process, which includes a bottom-up review of all past and ongoing EM Program activities at Paducah, provides a dynamic approach to developing effective EM Program strategies and resolving all environmental technical, operational, and administrative issues so that environmental actions can be effectively and expeditiously completed.

The Document is a result of the MAP and incorporates recommendations developed therein. It represents a concise “snapshot” of the Paducah EM Program at the present time and includes a summary of past accomplishments and the status of the Paducah EM Program, as well as the future strategy, rationale, schedule, and funding requirements necessary to meet program objectives. This Document is a single, consolidated document that identifies the Paducah EM Program’s strategic course of action for restoration. Like the Process itself, this Document is dynamic and will be updated annually.

1.2 ORGANIZATION OF THE MANAGEMENT ACTION PROCESS DOCUMENT

The Document is organized into the following areas:

Section 1--Describes the mission, vision, and objectives of the Paducah EM and Enrichment Facilities Program and describes the purpose of the MAP and the organization of the document. This section identifies key participants in the Process including the Department of Energy and contractor management and technical personnel, regulators, and stakeholders; describes the interrelationships of the EM Program to other environmental management and Department organizations, as well as interfaces with regulators, stakeholders, and the public. Also included is a summary of MAP accomplishments and a strategy for continuing the process (i.e., steps used in implementing the Process together with a discussion of steps that follow) including planned process adjustments to

improve the Process.

Section 2--Provides a description of site natural and physical characteristics including its environmental setting and facilities, infrastructure, and equipment. It summarizes local community and regional social, economic, cultural, and ecological factors influencing the site. It describes operational history; current and adjacent site uses; off-site contamination; and planned, proposed, or projected future uses of the land, facilities, and equipment.

Section 3--Summarizes the status of EM Program activities for contaminated sites and buildings including identification of contaminant release sites, associated relative risk, status of assessment, and remediation efforts. It describes the environmental condition of property and principal contaminant concentrations. This section defines appropriate regulatory programs under which contaminated sites are being addressed. It summarizes the history and status of other related elements of the Paducah EM Program including public participation, program management, support programs, etc.

Section 4 --Presents a qualitative summary of relative risk to the public, site workers, and the ecosystem for each contaminated site and building.

Section 5--Describes the EM strategy including key assumptions and strategies for characterization, remedy selection, and regulatory compliance. It presents strategies and plans for defining, sequencing, and streamlining actions at WAGs and individual contaminated sites. It summarizes strategies related to other elements including program management (e.g., funding), public participation, environmental justice, waste management, surveillance and monitoring, and technology development. It presents critical performance criteria for measuring the success of the EM Program.

Section 6--Presents a master schedule of planned and anticipated activities to be performed throughout the duration of the EM Program and identifies regulatory compliance schedules and specific milestones.

Section 7--Identifies specific technical and administrative issues directly and indirectly affecting the Paducah EM Program to be addressed and resolved by the MAP Project Team or higher authority if necessary. It also identifies special initiatives at site installations that will enhance EM Program efficiency.

Appendix A--Provides past cost and projected budgeted cost information for restoration and compliance projects.

Appendix B--Presents tabulated summaries of major EM documents.

Appendix C--Summarizes decision documents and RODs for remedial actions or no further action.

Appendix D--Presents conceptual models depicting contaminant sources, transport mechanisms, exposure pathways and routes, and receptors for contaminated sites exhibiting high relative risk.

Appendix E--Summarizes project controls for the Paducah EM Program including responsibility assignment matrices (RAMs), change control thresholds, reporting requirements, etc.

1.3 ENVIRONMENTAL RESTORATION VISION, MISSION, OBJECTIVES, GOALS, AND PRIORITIES

As a result of the complexity of the EM Program, a structured management approach is essential (**Figure 1-3**). The PGDP management approach begins with a strategic plan. The strategic plan defines the EM mission, vision, objectives, priorities, and challenges. The cleanup strategy identifies the release sites, endpoints, problems, and approach needed to meet the vision, mission, and objectives. Next, the projects which are needed to solve the problems are identified, defined, and prioritized. When the prioritized list of projects is matched to available funds, a funding profile is developed that defines what work will be accomplished and when it will be accomplished. The projects are then executed, and the results are compared with the desired vision, mission, objectives, and endpoints. This feedback loop facilitates the identification of needed changes in projects and prioritization or the need for solutions to problems that arise. It should be noted that Paducah is in the midst of a transition to Vision 2010. The key components of Vision 2010 include a reindustrialization strategy, a Waste Management strategy for treatment/disposal of DOE wastes, and a site restoration strategy to protect the public and industrial workers.

Vision 2010

The Paducah EM Program vision is to expedite risk reduction of DOE-legacy hazards to promote facility reuse through public and private partnerships, thereby preserving existing jobs and economic growth created from a continued industrial presence at the site.

Mission

The mission of the Paducah EM Program is to protect human health and the environment through effective and timely remediation that is based on cooperative, efficient, and cost-effective approaches consistent with state and federal regulations to achieve this vision.

Objectives

The ultimate objective of the Paducah EM Program is to remediate contaminated sites and decommissioned facilities in a safe, cost-effective, and timely manner to maximize beneficial reuse. In addition, while pursuing the mission and vision, DOE will strive to achieve the following objectives that serve to guide the decision-making process within the EM Program:

- Be a valued asset to co-workers, public, regulators, and the academic, economic, and technological communities.
- Find, recognize, and implement better ways.
- Effectively utilize available resources for site management and cleanup.
- Minimize waste generation and implement innovative treatment and disposal technologies.
- Commit to helping one another achieve our potential.
- Work at making our vision a reality.
- Serve as a model steward of natural and cultural resources;
- Focus on customer satisfaction and collaborative decision making; and
- Demonstrate a commitment to excellence.

INSERT FIG 1-3

EM Program activities have been categorized into ten strategic priorities which also represent program objectives. These are listed below in order of priority.

- Protect public health.
- Protect worker health and safety.
- Protect the environment.
- Reduce off-site contamination.
- Contain and control contamination.
- Reduce the landlord and surveillance and maintenance costs.
- Release facilities and land for public beneficial use.
- Make prudent investment decisions.
- Maintain the essential infrastructure.
- Reduce uncertainty through characterization.

These ten strategic priorities, along with the ERBAM Process (discussed in Section 5.3.3) guide, budget priorities and plan and sequence work activities. They are provided so that every employee and stakeholder can understand the framework within which the EM Program is designed and executed.

In order to minimize impact to the work force and community due to a plant closure, DOE has also initiated an Alternative Missions Plan. This plan is to serve as a foundation on which to develop an implementation plan for pursuit of alternative missions at PGDP, if and when it becomes necessary. Most of the actions would be initiated after USEC gives DOE its two-year notice of intent to terminate the lease at Paducah. It suggests various strategies that could be implemented to evaluate alternative missions in detail and pursue others that may be applicable to site reuse.

Goals

The Paducah EM Program, utilizing Vision 2010, has the following aggressive, specific, and measurable goals structured to achieve performance:

- **Reindustrialization Plan**

  - Recognize USEC as DOE's first and foremost reindustrialization partner at Paducah and obtain long-term lease commitments to continue the uranium enrichment process
  - Actively solicit PGDP as the preferred location for:
    - building and operating the AVLIS technology
    - building and operating a facility to convert DUF_6 for reuse
  - Team with local economic development interests to attract both private and government sector partners to achieve reuse of underutilized DOE facilities and land, including nonleased DOE assets and leased assets returned by USEC
  - Promote resource conservation through:
    - active participation in the ORO Metal Recycling Program,
    - conversion for reuse of DUF_6, and
    - long-term lease commitments to preserve ongoing wildlife management practices.

- **Waste Management Plan**

  - Treat and dispose of all Paducah DOE wastes currently in storage by FY 2010.
    - Vortec to treat 80 percent of Paducah wastes by FY 2002.
    - Treat all mixed wastes by FY 2009.
    - Ship all scrap metal for recycling by FY 2007.

- Transfer financial responsibility for the management of newly generated wastes to generator by FY 2000.
- Complete ongoing infrastructure upgrades by FY 1997.
- Complete RCRA closures of C-733, C-746-A, and C-746-R Hazardous Waste Storage Facilities by FY 2009.
- Implement all work via Incentive Task Order by October 1996.
- Levelized funding to FY 1998 Target.

- **Environmental Restoration Plan**

  - Complete decision documents on "high risk" sites by FY 2000 with the exception of WAG 24
  - Identify and implement streamlining/cost-effective methods to accomplish work to meet Vision 2010 goals within a flat-line budget (FY 1998 funding projections).
  - Combine WAGs to streamline the RI/FS process, thereby avoiding costs associated with multiple field mobilizations and documents. Streamlining/cost-effective methods for WAGs 27, 28, and 3 to accomplish RODs by FY 2000.
    - Minimize documentation and accelerate the process through use of interim actions and streamline risk assessments.
    - Focus data collection and eliminate two-phased RFIs through enhanced DQO process, better utilization of existing data, and flexible work plans with field screening techniques.
    - Maximize upcoming opportunities to apply presumptive remedies and use EM-50 funding.

Priorities

The Paducah EM Program has several high priority activities. They fall into the following broad categories and specific examples of high priority activities are given for each:

- Reduce/minimize current off-site risks:
  - Examples of the achievements in this area include sampling of Paducah off-site residential wells and extending a municipal waterline to residents affected by off-site groundwater contamination.

- Prevent/reduce off-site contaminant migration:
  - Examples of the achievements in this area include construction of the Pilot Treatment Plant to hydraulically contain and treat high concentrations of off-site TCE contamination in the Northwest Plume; completion of the North-South Diversion Ditch (NSDD) to treat certain plant effluent and control the migration of sediment; currently designing the containment system for the Northeast Plume which incorporates the Cooling Towers for treatment of contaminated groundwater; installation of sediment controls to mitigate surface water/sediment runoff from scrapyards; and institutional controls for off-site contamination in surface water, outfalls, and lagoons.

- Evaluate/remediate suspected sources of off-site contamination:
  - Program focus is currently being shifted to concentrate efforts on evaluating/remediating suspected sources of off-site contamination. Two RFI work plans and respective fieldwork have been completed for WAGs 1 and 7 and WAG 17. An RI Report for WAGs 1 and 7 and two RI Addendums for WAGs 22 and 23 have been submitted to the regulators. An FS for WAG 22 has been approved and FSs for WAGs 1 and 7 and 23 have been submitted to regulators.
- Evaluate/remediate suspected sources of on-site contamination:
  - A preliminary RFI work plan for WAGs 3 and 11 was submitted to the regulators.

- Reduce on-site contamination and risk:

- An example of an achievement in this area is LASAGNA which involves an innovative technology demonstration involving TCE contaminated soil. Also, signs have been posted along the NSDD.

- Cost-effectively maintain essential infrastructure and facilities:
  - Examples of the achievements in this area include S&M activities conducted under incentive contracting and landlord activities prioritized based on requirements and ES&H Program benefits.

- Make prudent business decisions:
  - Examples of achievements in this area include the institutionalization of an incentive contracting approach; the inclusion of a cost-effective parameter in the prioritization process; the use of a streamlined environmental documentation strategy; the use of strategic technology development; and the sharing of experiences and lessons learned with other DOE sites. Conducting metal recycling initiatives to use the private sector and development and implementation of the "necessary and sufficient" process are also underway.

- Release remediated facilities and land for public use:
  - Planned activities include reducing the Paducah Reservation “footprint” via cleanups and No Further Action determinations and the identification of facilities for reuse by the private sector.

- Reduce uncertainty and remediation costs through site characterization:
  - Examples of achievements in this area include working with regulators to streamline and focus the RI/FS process, maximizing the use of existing data in the RI/FS process, and participation in DQO.

- Prioritize EM Program activities for risk-benefit and cost-effectiveness:
  - A key achievement in this area is the development and implementation of a formal risk-based system that involves the state and federal regulators to prioritize all EM Program activities. Stakeholders comments are incorporated into the formal prioritization process.

- Involve stakeholders in planning and prioritization:
  - Examples of achievements in this area include the use of public information meetings; the use of working groups' involvement in development of cleanup alternatives; publication of the prioritization list; and the initiation of Site-Specific Advisory Boards. Planned activities include getting the Site-Specific Advisory Board involved in planning, prioritizing, and collaborative decision making.

1.4 MAP PROJECT TEAM

A MAP Project Team has been established to implement the Process for the Paducah EM Program. The Project Team includes key personnel from the Department’s Paducah Site Office and Lockheed Martin Energy Systems, Inc. and Jacobs Engineering Group, the two DOE prime contractors with responsibility for remediation and the conduct of site activities. The Process also considers active and constructive participation by regulators and stakeholders to be integral to the success of the process. Therefore, EPA, Region IV, and KDEP represent the regulatory agencies with oversight responsibilities for the EM Program on the MAP Project Team. Stakeholder groups on the Project Team will include representatives from the Site Specific Advisory Board (SSAB). It is important to note that the MAP Project Team is identical to the Site Management Plan (SMP) Team. Participants have met extensively on the SMP, program deliverables, prioritization, and scheduling. All of this information is included in the MAP along with the next level of detail and information on Waste Management activities. **Table 1-4-1** lists the Project Team’s core members and key participants. **Figure 1-4** shows the Site Management Oversight Team, Executive Level.

At present a deficiency in the composition of the MAP Project Team is that a member from the SSAB has not been included. Once the SSAB is a fully chartered board, a representative will be assigned to the MAP project team.

Table 1-4-1. MAP Project Team

MAP Project Team (SMP Steering Committee) Members			
Name	**Title**	**Organization**	**Phone**
James Wagoner	Ports/Paducah/Weldon Springs Team Leader	DOE - ER Division -HQ	(301) 903-8147
Behram Shroff	Environmental Project Engineer/HQ Program Manager	DOE - HQ	(301) 903-2588
Myrna E. Redfield	ER Program Manager and Lease Management	DOE - ER Division	(502) 441-6815
Carlos R. Alvarado	Facility Management and ER Program Manager	DOE - ER Division	(502) 441-6804
Dave W. Dollins	ER Specialist	DOE - ER Division	(502) 441-6819
David Tidwell	Waste Management Project Manager	DOE -ER Division	(502) 441-6807
Tony Able	Remedial Project Manager	EPA, Region IV	(404) 347-3555
Tuss Taylor	UK FFOU Manager	Representing KDWM	(502) 564-4797
Jack Stickney	UK FFOU Assistant Manager	Representing KDWM	(502) 564-4797
John Morgan	Regulatory Integration Manager	LMES	(502) 441-5070
Brad Montgomery	ER Program Management Manager	LMES	(502) 441-5075
Ross Miller	Groundwater Monitoring and Technology Manager	LMES	(502) 441-5085
Sam M. Leone	Manager of Waste Management	LMES	(502) 441-5221
Don Wilkes	Site Manager	Jacobs Engineering Group	(502) 462-2550
Gary Reside	Technical Services Manager	Jacobs Engineering Group	(502) 462-2550
TBD.	TBD.	Site Specific Advisory Board	(502)

insert fig 1-4

1.5 ORGANIZATIONAL INTERFACES

The accomplishment of the EM Program mission and objectives requires guidance, oversight, and support of various Department and external organizations. The program roles and responsibilities for the primary participants in the EM Program are detailed in DOE/ORO 931, *Management Plan for the Oak Ridge Operations*
Environmental Restoration Program, issued February 1991. The functions of these organizations, their relationship to the EM Program, and their responsibilities are described below:

Table 1-5-1. Paducah ER Program responsibility.

Name of Organization	Role/Responsibility
DOE-HQ EM	Responsible to the Secretary of Energy. Administers the DOE EM Program nationally.
DOE-ORO Assistant Manager, ER and Waste Management	Responsible to the DOE-ORO Manager. Manages the EM Program at DOE-ORO-managed installations. Actual execution of work at PGDP is the responsibility of the PGDP DOE Site Manager.
LMES	Performance-Based Management Contractor at five DOE-ORO installations. Energy Systems is directly responsible for the RI, has oversight responsibility for all other work, participates on the sites that it manages, and is assigned the role of integrating contractor for this work through the ER Division at PGDP.
Jacobs Engineering Group, Inc.	Technical Support Contractor to DOE-ORO for ER work at PGDP. Responsible for the development of ER Program proposed plans, FSs, and RODs.
Foster Wheeler Environmental Corporation	Remedial Design Subcontractor to LMES. Principal Architect-Engineer for the design associated with remediation of designated sites at PGDP.
MK-Ferguson of Oak Ridge	Construction Manager (CM) subcontractor to LMES. For EM Program work, the CM contractor solicits bids for awards and manages fixed price and fixed-unit-price subcontractors for RA activities and projects.
Site Specific Advisory Board (SSAB)	The SSAB, once fully established, will review issues and provide input into the decision-making process on DOE environmental matters at PGDP.
Commonwealth of Kentucky/Natural Resources and Environmental Protection Cabinet (KDEP)	Administers the RCRA Permit and the KPDES Permit. They are also a party in the DRAFT FFA and the AIP. Representatives participate in many levels of decision-making at PGDP.
EPA, Region IV	Administers the HSWA Permit and is a party to the DRAFT FFA and Administrative Consent Order. Representatives participate in many levels of decision-making at PGDP.

Figure 1-4 also shows primary organizational interfaces. Through recent contract changes, the Design Contractor (Foster Wheeler) and the Construction Management Contractor (MK-Ferguson) are now sub-contractors to LMES instead of prime contractors to DOE. Even so, their roles are substantial and distinct enough to highlight them rather than combine them with that of LMES.

1.6 STATUS OF MANAGEMENT ACTION PROCESS

A core Project Team is being formed to define the EM Program's approach to the MAP. Periodic meetings are being held to assess the performance of the process and ensure that the right stakeholders are participating. EPA, Region IV, KDEP, and a subgroup of the local SSAB will be briefed on the MAP Process. Their hands-on participation will begin in February 1996.

1.7 STRATEGY FOR MANAGEMENT ACTION PROCESS

The MAP Project Team meets regularly in conjunction with status/working meetings to discuss and resolve strategic and high-priority issues. The meetings will typically be attended by MAP Project Team representatives
from DOE-Paducah, LMES, EPA, KDEP, regulators, and stakeholders. Few MAP Project Team meetings require participation by all members. Rather, the Project Team will identify the appropriate participants needed to make decisions on specific meeting issues. The Project Team meetings will serve as a forum for assessing progress, obtaining consensus on problem issues, and eliminating confusion regarding EM Program environmental activities.

Better communication among all parties will help eliminate duplication of effort and lead to decisions concerning how best to use limited resources. The Project Team concept and meeting goals are described below. The following issues will be considered for inclusion as action items and prioritized by the Project Team during its FY 1996 and/or subsequent meetings:

- Discuss the MAP and its implementation through Project Team meetings;
- Prioritize and assign action items;
- Evaluate and determine the relative risk associated with each contaminated building and each release site;
- Review long-term costs associated with "core" program activities including program management, maintaining surplus facilities, and identify potential opportunities to reduce these costs;
- Review key program assumptions and develop contingency plans in case of changes in key assumptions;
- Evaluate emerging technologies;
- Review the comprehensive Master Schedule to determine related compliance projects which should be better defined or added;
- Perform periodic updates and modifications as needed and identify opportunities for combining remedial activities or for critical-path concerns among, as well as within, OUs;
- Evaluate progress and status in identifying and addressing data gaps; and
- Further implement incentive contracting.

2. SITE DESCRIPTION AND COMPREHENSIVE PLANNING

2.1 OPERATIONAL HISTORY

Production of enriched uranium began in the early 1940s as a defense department initiative to produce fissionable material for the atomic bomb. Later, the enrichment program was transferred to the Atomic Energy Commission (AEC), and the country's first gaseous diffusion plant, K-25 at Oak Ridge, Tennessee, went on-line in 1945.

In 1950, the AEC began the selection process for the second gaseous diffusion plant. On December 15, 1950, the National Security Resources Board chose the Paducah site from a short list of eight proposed locations. The site chosen for the Paducah Plant was the old Kentucky Ordnance Works (KOW). The KOW was operated by the Atlas Powder Company throughout World War II on a 16,126-acre tract of former agricultural land. At the end of World War II, it was turned over to the Federal Mortgage Corporation and then to the General Services Administration. Prior to World War II, the land was used for numerous small farms which produced various grain products and provided pasture for livestock.

The day following the National Security Resources Board announcement, TVA announced plans to build a coal-burning steam plant (Shawnee) near the site, and a few weeks later, Electrical Energy, Incorporated announced intent to construct a massive electrical generating plant in Joppa, Illinois, to support the plant. F. H. McGraw and Company of Hartford, Connecticut, was awarded the construction contract and Carbide and Carbon Chemicals Company was named operating contractor.

The original plant design was completed and operated two months ahead of schedule with the first production cells going on-line in September 1952. Enriched uranium product withdrawals soon followed in November 1952, and the first two and one-half-ton product cylinders filled with partially-enriched uranium were shipped to Oak Ridge, Tennessee.

While the C-331 and C-333 uranium enrichment cascade buildings were still under construction, a decision was made to double the plant's production capacity. Uranium enrichment continued in the first portion of the plant while the second portion was completed. The two enrichment cascades were linked, enabling the Paducah Plant to operate a "parallel cascade" heralded as the most efficient enrichment method yet.

The generation of enriched uranium, PGDP's primary product, requires extensive support facilities. Enriched uranium is uranium in which the concentration of the fissionable U^{235} has been increased. Natural uranium is mostly U^{238}, with about 0.72 weight-percent U^{235} and 0.005 weight-percent U^{234}. Uranium mills process the ores to produce a concentrated uranium oxide, U_3O_8, that is commercially converted to UF_6 for enrichment in the gaseous diffusion plant. The enrichment mechanism is based on the fact that a UF_6 molecule containing U^{235} is slightly lighter than a UF_6 molecule containing U^{238}. As the UF_6 molecules move through several miles of tubing in the diffusion plant's cascade system, slightly more U^{235} than U^{238} escapes through the small holes in the tubing. As the process of cascading is repeated, the U^{235} concentration increases. About two-thirds of the U^{235} in the natural ore is extracted during enrichment, so there are two product streams: 1) enriched uranium product and 2) depleted uranium tails. The majority of the depleted tails are stored on-site in 14-ton steel cylinders.

Facilities are required to store, process, and manage the two uranium components (enriched and depleted). Also, at present, uranium enriched at PGDP is further enriched at another gaseous diffusion plant in Portsmouth, Ohio. Accordingly, packaging and transportation facilities are necessary. Most of the uranium from PGDP is ultimately designated for the commercial sector as fuel for nuclear power reactors in the United States and abroad.

Extensive support facilities are required to maintain the diffusion process. These include a steam plant, four electrical switchyards, four sets of cooling towers, a chemical cleaning and decontamination facility, water and wastewater treatment plants, and maintenance and laboratory facilities. Several inactive facilities are also located on the plant site.

In 1984, Martin Marietta Energy Systems, Inc. (Energy Systems) replaced Union Carbide Nuclear Division as the prime contractor to DOE for management of PGDP. The long-term strategic goal within Energy Systems is to be recognized nationwide for leadership in protecting our people, the public, and the environment while conducting outstanding research and development, maintaining first-rate production operations, and remedying past environmental practices. The Paducah Plant mission has changed, perhaps most significantly in the 1960s, when the production focus was changed from military applications to fueling commercial nuclear power reactors that generated electricity. Today, the plant's mission continues to be production of low-cost fuel for use in commercial nuclear power reactors.

In November 1992, the Energy Policy Act of 1992 created USEC. USEC leases the production facilities from DOE, while DOE still maintains ownership of PGDP. Pursuant to this change, effective July 1, 1993, USEC assumed responsibility for the Uranium Enrichment Program and leased plant facilities dedicated to that mission from DOE. DOE retained responsibility for environmental restoration and waste management (ERWM) activities resulting from its operations at the site prior to July 1993. All waste management activities at PGDP are included within the scope of the EM Program. Martin Marietta Energy Systems, Inc. remained under contract to DOE to perform ERWM work. Martin Marietta Utility Services, Inc., a new subsidiary of Martin Marietta Corporation, assigned responsibility for the operation and maintenance of the uranium enrichment plants. USEC's responsibilities are for marketing, production, and sales of uranium enrichment services and compliance activities related to production. DOE's roles and responsibilities are environmental restoration, waste management, environmental monitoring, corrective actions, cylinder management, and lease agreement. Landlord acitivities are the responsibility of both USEC and the DOE Uranium Enrichment Organization. This responsibility will continue until the shutdown of operations, when it will transfer to EM Program. DOE contracted with MMES to perform these functions as previously described. In 1995, Lockheed Aerospace and Martin Marietta merged to form Lockheed Martin Corporation.

Table 2-1-1. History of operations at PGDP.

Period	Operating Contractor	Type of Operation	Hazardous Substance Activities	Map Reference
1951 - 1984	Union Carbide	Uranium enrichment	*	Fig. 2-1-1
1984 - July 1, 1993	Martin Marietta Energy Systems	Uranium Enrichment	*	Fig. 2-1-1
July 1, 1993 - 1995	Martin Marietta Utility Services	Uranium Enrichment	*	Fig. 2-1-2
July 1, 1993 - 1995	Martin Marietta Energy Systems	Environmental Restoration and Waste Management	*	Fig. 2-1-2
1995 - present	LMUS	Uranium Enrichment	*	Fig. 2-1-2
1995 - present	LMES	ER and Waste Management	*	Fig. 2-1-2

***** The uranium enrichment process and, therefore, PGDP have not changed significantly. During past DOE operations, hazardous substances, waste, or constituents generated as byproducts from the enrichment process were released into the environment. The generation of enriched uranium, PGDP's primary product, requires extensive support facilities. About two-thirds of the U^{235} in the natural ore is extracted during enrichment, so there are two product streams: 1) enriched uranium product and 2) depleted uranium tails. The majority of the depleted tails are stored on-site in 14-ton steel cylinders. Extensive support facilities are required to maintain the diffusion process. These include a steam plant, four electrical switchyards, four sets of cooling towers, a chemical cleaning and decontamination facility, water and wastewater treatment plants, maintenance and laboratory facilities, and one active landfill. Several inactive facilities are also located on the plant site. Examples of hazardous substance activities which have been discontinued since June 1993 include the TCE degreasing operation in C-400 and the use of chromium in the cooling towers. PCBs may still reside in transformers on-site. Chlorofluorocarbons (CFCs) are utilized in the cooling towers. EM Program activities deal mainly with legacy waste. Operating ER facilities, such as the Northwest Plume Pilot Plant, generate very little waste.

Figure 2-1-1 is a map dated June 1982 before the leasing of facilities to USEC. **Figure 2-1-2** shows those production facilities leased to USEC (LMUS) and those retained by DOE (LMES).

2.2 ENVIRONMENTAL SETTING

PGDP is located in McCracken County, in western Kentucky, about 4.8 Km (3 miles) south of the Ohio River and approximately 16 km (10 miles) west of the city of Paducah (**Figure 2-2-1**). Approximately 90 percent of the area within an 8-km (5-mile) radius of the plant is agricultural or forested land. Urban and industrial lands comprise less than 4 percent of the surrounding area and surface water bodies cover approximately 5 percent. Immediately adjacent to PGDP is the West Kentucky Wildlife Management Area (WKWMA), which is used by a considerable number of hunters and fishermen each year. The small communities of Grahamville, Heath, and Kevil are within a 5-km (3 miles) radius of the DOE property boundary. Metropolis, Illinois, is located north of PGDP across the Ohio River. The Shawnee Steam Plant, which is owned and operated by the Tennessee Valley Authority (TVA), is located along the northern boundary of the DOE property.

PGDP (**Figure 2-2-1**) is located on a 3423-acre parcel of land owned by DOE. The primary operations associated with the enrichment process are located on the 748 acres within the plant security fence. Of the remaining DOE acreage outside the fence, 2080 acres are leased to the Kentucky Department of Fish and Wildlife as part of the WKWMA.

PGDP is located within the drainage areas of Big Bayou and Little Bayou Creeks, which meet about three miles north of the site and discharge into the Ohio River. Big Bayou Creek, which flows along the western boundary of the plant, is a perennial stream whose drainage extends from approximately two and one-half miles south of the site to the Ohio River. Little Bayou Creek, which originates in the WKWMA, flows north toward the Ohio River along a course that includes parts of the eastern boundary of the plant. During dry weather, much of the flow in both creeks is due to controlled effluent releases from PGDP. These effluents constitute about 85 percent of the normal flow in Big Bayou Creek and 100 percent in Little Bayou Creek.

insert lease map Fig 2-1-1

insert lease map Fig 2-1-2

Insert 2-2-1

Physiography, Geology, Topography. PGDP is situated in an area characterized by low relief. Elevations vary from about 106.7 to 118.9 m (350 to 390 ft) above mean sea level (amsl) on plant property, with the ground surface sloping at a rate of approximately 5.1 m/km (27 ft/mile) toward the Ohio River. Two main topographic features dominating the landscape of the surrounding area are 1) the loess-covered plains, at an average elevation of 118.9 m (390 ft); and 2) the Ohio River floodplain zone, dominated by alluvial sediments, at an average elevation of 96.1 m (315 ft) amsl. The terrain of PGDP is slightly modified by the dendritic drainage systems associated with the two principal streams in the area, Big Bayou Creek and Little Bayou Creek. These northerly flowing streams have eroded small valleys which are approximately 6.1 m (20 ft) below the adjacent plain.

The stratigraphic sequence (**Figure 2-2-2**) in the region consists of fine-grained aeolian sediment called loess. However along rivers or creeks, the uppermost sediment is typically alluvium. Below the loess or alluvium lie the Upper and Lower Continental Deposits. The Upper Continental Deposits consist of a fining-upward sequence of clay, silt, sand, and gravel deposited in a lacustrine environmental. The Lower Continental Deposits are fluvial and predominately consist of gravel mixed with varying percentages of sand, silt, and clay.

A buried Porters Creek Clay terrace is present in the southern part of PGDP. This terrace is an erosional remnant formed by the ancestral Tennessee River during the Plio-Pleistocene Period. As a result of this period of erosion, the Porters Creek Clay is absent from the PGDP area north of the terrace.

Above the Porters Creek Clay, south of the terrace face, lies the Terrace Gravels. Further south near the edge of DOE property, the Eocene Sand is present between the Porters Creek Clay and the Terrace Gravels.

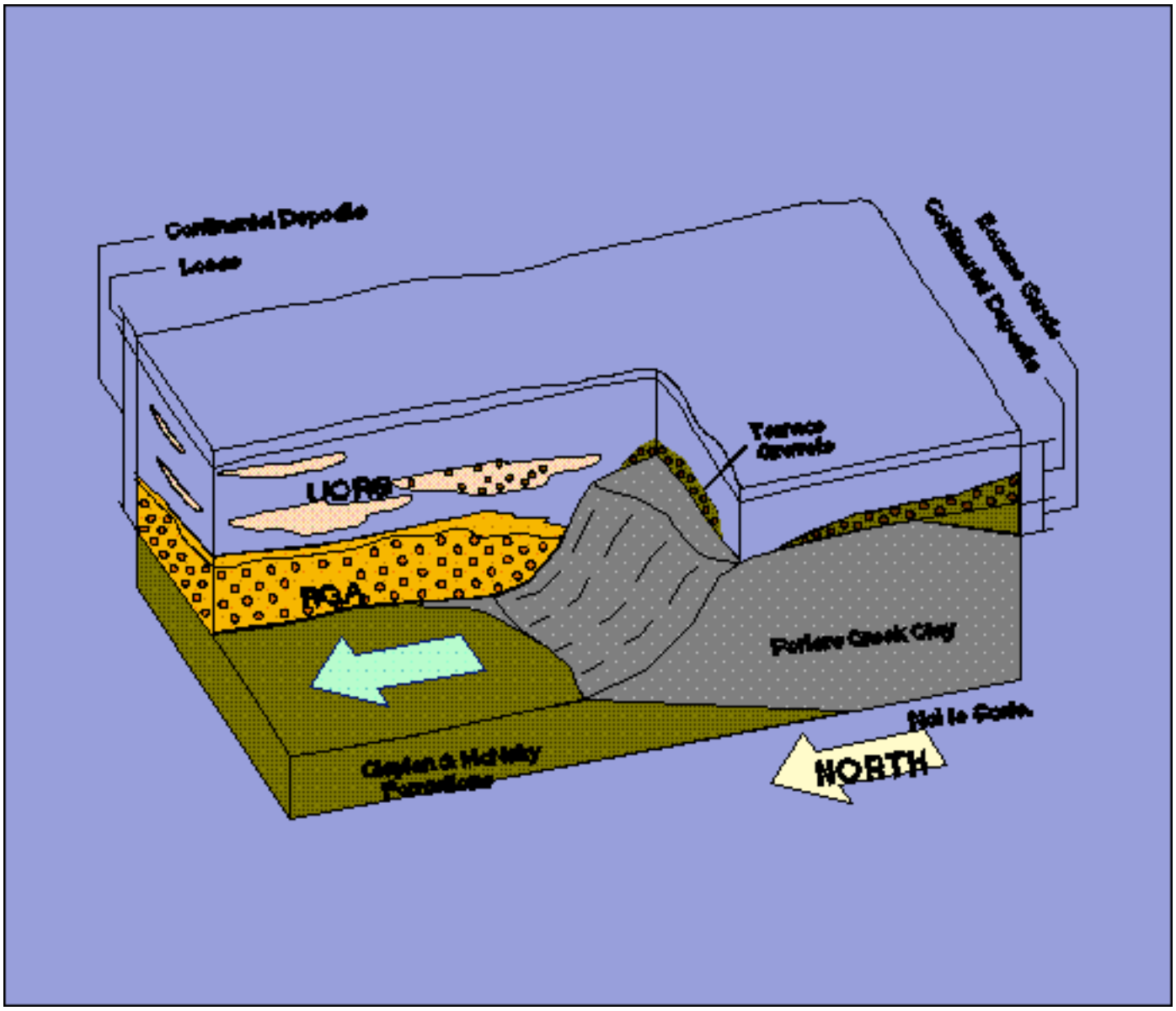
The McNairy Formation lies beneath the Porters Creek Clay south of the terrace and unconformably beneath the Lower Continental Deposits north of the terrace. The upper 15 m (50 ft) of this formation consists of a sequence of marine clays, silts, and unconsolidated sands and occasional fine gravel. **Figure 2-2-3** is a conceptual block diagram.

Soils. Six soil types are associated with PGDP as mapped by the Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service (Humphrey, 1976). These are Calloway silt loam, Grenada silt loam, Loring silt loam, Falaya-Collins silt loam, Vicksburg silt loam, and Henry silt loam. The dominant soil types, the Calloway and Henry silt loams, consist of nearly level, somewhat poorly drained to poorly drained soils that formed in deposits of loess and alluvium. These soils tend to have low organic content, low buffering capacity, and acidic hydrogen-ion concentrations (pH) ranging from 4.5 to 5.5. The Henry and Calloway series have a fragipan horizon, a compact and brittle silty clay loam layer that extends from 26 inches below land surface BLS) to a depth of 50 inches or more. The fragipan reduces the vertical movement of water and causes a seasonally perched water table in some areas at PGDP. Past construction activities have disturbed the fragipan layer in some areas within the former KOW and PGDP.

Hydrology. The two primary hydrogeologic units present in the vicinity of PGDP are the Upper Continental Recharge System (UCRS) and the Regional Gravel Aquifer (RGA). The UCRS is a hydrogeologic unit contained within the loess layer and the Upper Continental Deposits. This hydrogeologic unit contains numerous sand and
gravel lenses within a less permeable clayey silt matrix. These sand and gravel lenses occur at various elevations beneath the reservation and their degree of interconnection is not known. The ultimate flow direction in this unit is downward. Below the sands and gravel, a predominately clay, silt, or clayey silt layer acts as an upper, semi-confining unit for the RGA. This layer is relatively continuous across PGDP, but its thickness varies. It is typically thinner toward the eastern half of the plant.

Figure 2-2-2

Figure 2.2.3



The RGA is a hydrogeologic unit which is primarily contained within the Lower Continental Deposits. The RGA encompasses sands at the base of the Upper Continental Deposits directly overlying the Lower Continental RGA gravel. In addition, the RGA has been found to include sands in the upper part of the McNairy when they are present directly below the RGA gravel. This hydrologic unit pinches out at the base of the Porters Creek Clay terrace. The RGA typically has a relatively high hydraulic conductivity and serves as a major water supply aquifer for the region. The RGA has been identified as the uppermost aquifer at PGDP.

2.3 ON-SITE AND OFF-SITE LAND USES

2.3.1 Land Use Designations

The current land use, at the site which is depicted in **Figure 2-3-1,** has been designated as mixed industrial/recreational use. This section provides a general overview of land-use designations, on-site facilities outside of the boundary, off-site facilities owned by DOE, and land responsibility per the lease agreement between DOE and USEC.

The following classifications are currently utilized:

1. On-Site Secured--Industrial (Owned by DOE)
2. On-Site Recreational (Owned by DOE, leased to WKWMA)
3. On-Site Unsecured--Industrial (Owned by DOE)
4. Off-Site Recreational (WKWMA)
5. Off-Site Rural Residential
6. Off-Site Industrial (Shawnee Steam Plant, TVA)

Please refer to **Figure 2-1-1** which shows those facilities leased to USEC and those facilities retained by DOE.

2.4 SOCIAL, ECONOMIC, NATURAL, AND CULTURAL FACTORS

Social. PGDP is located in McCracken County in western Kentucky. The population for McCracken County, as of July 1994, was reported as 64,630 persons with 26,853 persons residing in Paducah. Two counties near McCracken reported the following population: Ballard County, Kentucky, 8080; and Massac County, Illinois, 15,189 (DOC, 1994a). The total population within the 81-km (50 mile) radius of the plant was estimated at 500,000, with approximately 66,000 residing within a 16-km (10 mile) radius of PGDP (DOC, 1994a).

Economic. PGDP is the largest employer in the region, currently employing more than two thousand people including all agencies and contractors at the site, and the Shawnee Steam Plant employs 425 workers (TVA, 1995). McCracken County's labor force in June 1995 was recorded at 33,000 persons. Employment was recorded at 31,900 persons, with unemployment recorded as 1100 persons. Unemployment in McCracken County (3.4 percent) was less than the Commonwealth of Kentucky (5.0 percent) and the United States as a whole (5.8 percent). Construction accounted for 4 percent of employment, retail sales accounted for 27 percent, and manufacturing accounted for 14 percent (DOC, 1994). The average 1993 per capita income in McCracken County was $19,647 as compared to 1994 averages of $17,807 per capita in Kentucky and $21, 809 in the United States (DOC, 1994).

insert 2-3-1

Historical, Archaeological, and Cultural Resources. Cultural resources were evaluated for PGDP during the 1993 COE environmental investigation of PGDP (COE, 1994). The COE study encompassed 11,719 acres which included the entire DOE reservation (3423 acres). The State Historic Preservation Officer (SHPO) has concurred that no properties that should be included or are eligible for inclusion on the national list of historic places exist inside the fence of PGDP. Additionally, the SHPO has concurred with the determination that all of the area inside the fence has been previously disturbed and, consequently, is not likely to contain any undisturbed sites of archaeological significance. Areas surrounding the security fence are assessed on a project-by-project basis. Pursuant to the COE study, 35 recorded archaeological sites and several more unrecorded are known to the study area. Most of the sites are prehistoric and located in the Ohio River floodplain. None have been nominated to the National Register of Historic Places (NRHP), although some are potentially eligible. Note that only about 25 percent of the area has been surveyed and the study concluded that there is a high potential for additional site. Furthermore, the study does not consider the historical significance of either the former KOW or PGDP, which are both likely to have facilities eligible for listing on the NRHP.

2.5 FACILITIES, EQUIPMENT, AND INFRASTRUCTURE

The 127 buildings at PGDP have a total gross floor area of more than eight million square feet. The plant area is dominated by four large process buildings containing about 75 percent of the plant's total floor space. Many of the plant buildings are more than 40 years old, but the condition of most is deemed adequate for the current mission. All facilities require proactive maintenance and repair to ensure continued value of the investment.

The plant has an extensive infrastructure of:

- gaseous diffusion process systems;
- process coolant capabilities including major cooling tower systems;
- a full range of utilities including steam generation systems; electrical distribution systems; pressurized air systems; sanitary and storm sewer systems; sewage treatment facilities; and process and sanitary water supply, treatment, and distribution;
- fire protection systems;
- medical facilities;
- communication networks;
- maintenance and machine shop capabilities;
- emergency management and plant protection;
- emergency operations center;
- waste management and environmental support;
- waste management structures;
- environmental and analytical laboratories;
- environmental monitoring systems;
- extensive road and rail transportation systems; and
- office buildings to support operations and administration.

While PGDP is owned by DOE, the facilities, equipment, and infrastructure related to the production of enriched uranium are leased to USEC. **Figure 2-1-2** depicts property which is leased to USEC and property retained by DOE at PGDP. Appendix F includes a list of the property and its status per the July 1, 1993 Lease Agreement. Appendix G includes a DOE facility ownership index with the appropriate landlord. C-340 and C-410 are currently in the D&D Program.

Operating facilities (some associated with utilities) such as the electrical switchyards, scrapyards, and

the cooling towers are not scheduled for investigation until after the production of enriched uranium has ceased. Therefore, environmental restoration of PGDP will not be complete until production of enriched uranium is ceased and the operational facilities are transferred from USEC to DOE and the D&D Program.

The impact of the utilities on the EM Program is currently being evaluated. A hydrogeologic utility survey is being conducted as part of WAG 6 investigations. The purpose of this investigation is to determine what, if any, impact the utilities are having on the hydrologic system beneath PGDP. This information is critical to understanding and confirming the conceptual site model as presented in Appendix D.

2.6 FUTURE USES FOR LAND, FACILITIES, AND EQUIPMENT

Future land use planning is currently performed for Paducah in accordance with the DOE Site Development Planning Order 4320.1B. DOE-ORO provides planning oversight for this activity. The products of these efforts are the annual Site Development Plans and their accompanying support document (Technical Site Information). In response to CERCLA requirements and a recent directive from EM-1, site planning and community relations personnel resources at the Oak Ridge Reservation, Portsmouth, and Paducah are being used to create proposed options for future land uses for each reservation. This effort will combine land use needs from a broad representation of internal and external stakeholders and will fully use previous and ongoing planning and community relations programs personnel.

Due to the current lease arrangement with USEC, DOE Headquarters agreed that the Future Land Use Study for PGDP and Portsmouth could be downscoped from a comprehensive evaluation to a limited use study.

In making an assumption for future land use at Paducah, the factors considered were 1) stakeholder input, 2) existing laws and lease commitments, and 3) the nature of the environmental contamination present at the site.

Public Interaction. DOE began preliminary discussions with stakeholders on future land use at Paducah during a public workshop on June 30, 1994. Subsequently, future land use was presented and discussed at public workshops on December 1, 1994, January 26, 1995, and September 26, 1995. In addition, the subject has been discussed at various meetings with the PGDP Neighborhood Council, the PGDP Environmental Advisory Committee, city and county officials, and economic development interests.

The Neighborhood Council, administered by LMUS, is an eight-member body comprised of individuals who live near the plant. In general, these organizations, including city and county officials, support continued industrial/commercial presence at the site that would preserve existing jobs and continue to contribute to the regional economy.

The Environmental Advisory Committee suggested some specific uses of the property that involved turning the facility into a national research center to test new technologies for groundwater remediation.

Another major stakeholder in the region besides DOE and USEC is Kentucky Department of Fish and Wildlife (KDFW). KDFW has indicated that it supports the current land use arrangement at the site; however, if DOE ever decides to sell the property currently leased to KDFW, they would like the first opportunity to acquire the property before it is offered to another entity.

Of the residents living in a three-mile radius of the plant that choose to express views on this subject,

the majority had a preference to retain the jobs and economic benefits associated with the current land use practices. However, they have expressed a desire to ensure that site contamination is adequately contained within the DOE property, thus preventing off-site migration that may result in devaluation of their properties.

Certain environmental activist groups have suggested that the area outside the plant fence be remediated enough to prevent further migration of contaminants off-site but stopped short of recommending cleanup to green field standards because of the exorbitant costs involved and the lack of technologies to accomplish such a standard. However, these groups suggest an "iron fence" approach to the 748-acre fenced area, restricting access and continuing surveillance and maintenance. These groups have suggested that DOE offer to buy out
any property owners in the vicinity of the plant whose property is contaminated or could potentially be contaminated.

PGDP is in the process of establishing a Site-Specific Advisory Board (SSAB) to review issues and provide input into the decision-making process on DOE environmental matters at PGDP. Once the SSAB is established, land use will be one of the first items discussed with the Board.

Future land use of the Paducah Gaseous Diffusion Plant. On October 24, 1992, the Energy Policy Act of 1992 became effective. This Act established USEC, whose charter is to provide uranium enrichment services on a profitable and competitive basis at PGDP. The original term of the lease is six years from July 1, 1993, with exclusive options to lease such facilities and related properties for additional periods. Lease agreements are also in place for the WKWMA to use certain DOE properties.

Based on the complex nature of wastes (e.g., radionuclides, dense nonaqueous phase liquids) present at the Paducah Plant, the future use of the site may be restricted and never be appropriate for certain uses such as residential.

After consideration of the above factors, the DOE Site Office at Paducah considers the current land use of mixed industrial/recreational as the most likely future use scenario for the site. **Table 2-6-1** illustrates the status of lands at PGDP. The GDP Turnover Contingency Alternative Missions Plan suggests various strategies that could be implemented to evaluate alternative missions in detail and pursue others that may be applicable to site reuse. Should additional information become available suggesting that an alternative land use may be more appropriate, the land use assumptions generated from the limited study will be revised accordingly.

insert table 2-6-1

3. STATUS OF ENVIRONMENTAL RESTORATION ACTIVITIES

This section summarizes the status of efforts to remediate release sites and contaminated buildings, including accomplishments, environmental condition of property, regulatory agreements and other legal drivers, waste management, and the history and status of other interrelated activities (public participation, program management, support programs, etc.).

3.1 CURRENT ENVIRONMENTAL RESTORATION ACTIVITIES

During past operations of PGDP, RCRA hazardous wastes, hazardous constituents, and hazardous substances generated as byproducts from the enrichment process were released into the environment. The source areas where releases originally occurred are often referred to as solid waste management units (SWMUs) and areas of concern (AOCs). In general, SWMUs and AOCs are typically areas such as burial grounds, spill sites, landfarms, surface impoundments, and underground storage units (USTs). The releases from these source areas can migrate into the surrounding soils and, in some cases, to the underlying groundwater and adjacent surface waters. In July 1988, groundwater samples collected from residential wells north of PGDP lead to the discovery of trichloroethylene (TCE) and technetium-99 (Tc-99) contamination. Subsequent investigations revealed that environmental releases from certain SWMUs and AOCs had migrated to the groundwater and surface waters resulting in off-site contamination and soils which may pose as long-term contaminant sources to other media. These areas now require investigation and remediation.

Complex sites with multiple environmental releases may choose to divide the site into smaller areas and conduct location-specific RI/FSs. These individual study areas (often referred to as Waste Area Groups (WAGs)) typically contain a limited number of SWMUs/AOCs grouped together based on the following criteria (reassignment of SWMUs/AOCs to other WAGs may occur as a result of new investigations or developments in technology):

- Common Remedial Technologies
- Common Geographic Locations
- Common Release Mechanisms
- Common Media Type
- Operating Units
- Common Contaminant Sites
- Common Operational Processes
- Common Surface Water Drainage
- Hydraulically-Connected Areas
- Suspected Sources of Off-site Contamination

Table 3-1-1 summarizes information on all releases sites currently identified. **Figures 3-1-1**a and **3-1-1b** includes their respective locations. Individual WAG maps are included as Appendix H. **Figure 3-1-2** is an Environmental Condition of Property map. The following categories are included in the map:

1) areas where no known release has occurred,
2) areas where no further action is required since it is being addressed by other regulations,
3) areas in which interim action are, or have been, taken,
4) areas under investigation, and
5) areas pending investigation.

insert figure 3-1-1a

Table 3-1-1. Release Site Summary.

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
1	C-747 OIL LANDFARM	23/27	5302/ 5302	R94F0016/ R95B0094	WASTE OIL - URANIUM, PCBS, AND TCE (F001)	2,250 ft^2, 5,000 gal	INVESTIGATION	H/H	
2	C-749 URANIUM BURIAL GROUND	22	5302	R95M0029	PYROPHORIC FORMS OF URANIUM METAL (D003), PETROLEUM-BASED AND SYNTHETIC OILS, OXIDES OF	URANIUM - 245,000 kg OILS - 59,000 gal TCE - 450 gal	INVESTIGATION/ REMEDIAL DESIGN OF AN IMPERMEABLE CAP	H	
3	C-404 LOW-LEVEL RADIOACTIVE HAZARDOUS WASTE BURIAL	22	5302	R95M0029	LIQUID URANIUM-BEARING WASTES (PRECIPITATED FROM AQEUOUS SOLUTIONS), UF_4, URANIUM METAL, URANIUM OXIDES, SOLID	EP TOXIC HAZARDOUS WASTES - 450 DRUMS URANIUM - 3,000,000 kg	CURRENTLY IN POST-CLOSURE MONITORING	H	RCRA CAP
4	C-747 CONTAMINATED BURIAL YARD	3	5313	R95M0047	CONTAMINATED AND UNCONTAMINATED TRASH, SOME BURNED, SCRAPPED EQUIPMENT	8300 ft^2 (50"x 165"); depth15 ft	PENDING INVESTIGATION	M	50
5	C-746-F CLASSIFIED BURIAL YARD	3	5313	R95M0047	SECURITY CLASSIFIED WASTES, SOME RADIONUCLIDE CONTAMINATED WASTES	168,000 ft^2 (840'x 200"); depth 8-12 ft	PENDING INVESTIGATION	M	
6	C-747-B BURIAL GROUND	3	5313	R95M0047	AREAS H and K - MAGNESIUM SCRAP; AREA I - LABORATORY EXHAUST FANS	AREA H - 75 ft^3, 180 ft^2 (12'x 15'), depth 6 ft AREAI - 8 FANS (800 lb), 280 ft^2 (8'x	PENDING INVESTIGATION	M	
7	C-747-A BURIAL GROUND	22	5302	R95M0028	AREA A - NONCOMBUSTIBLE TRASH ANS SOME CONTAMINATED EQUIPMENT; AREAS B, C, AND G - NONCOMBUSTIBLE CONTAMINATED AND	AREA A - 19, 250 ft^2 (70'x 275"), depth 10-12 ft, 100,000 ft^3; AREA B - 10, 200 ft^2 (60"x 170"), depth 6-7 ft; AREA C - 9,600	INVESTIGATION	H	
8	C-746-K INACTIVE SANITARY LANDFILL	7	5304	R94F0058	FLY ASH from COAL-BURNING OPERATIONS, SANITARY TRASH (BURNED and UNBURNED), POSSIBLY SOME SLIGHTLY CONTAMINATED TRASH	ROUGHLY CIRCLULAR, 200 TO 250 ft in DIAMETER, depth IS APPROX. 20 ft WITH ALL WASTE ORIGINALLY PLACED ABOVE-GROUND, VOLATILES and MEALS	INVESTIGATION	H	ENHANCED EXISTING CAP TO REDUCE LEACHATE MIGRATION FROM SURFACE INFILTRATION.

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
9	C-746-S RESIDEN-TIAL LANDFILL						NO FURTHER ACTION. PERMITTED UNDER KY'S SUBTITLE D SOLID		
10	C-746-T INERT LANDFILL						NO FURTHER ACTION. PERMITTED UNDER KY'S SUBTITLE D SOLID		
11	C-400 TRICHLOR O-ETHYLENE	6	5310	R94F0057	TCE	UNKNOWN	PENDING INVESTIGA-TION	H	
12	C-747-A UF_4 DRUM YARD	24	5302	R95C0021	DRUMS USED FOR STORAGE OF UF_4. THE DRUMS ARE EMPTIED, RINSED, AND CRUSHED PRIOR TO PLACEMENT IN THE	20,000 ft^2 (100'x 200 ')	PENDING INVESTIGA-TION	M	INSTALLATION OF SEDIMENT CONTROLS TO MITIGATE SURFACE WATER /SEDIMENT RUNOFF FROM
13	C-746-P CLEAN SCRAPYAR D	14	5313	R95M0048	CLEAN SCRAP METAL OF ALL TYPES	294,000 ft^2 (290'x 1076')	PENDING INVESTIGA-TION	M	
14	C-746-E CONTAMI-NATED SCRAPYAR D	24	5302	R95C0021	CONTAMINATED SCRAP METAL INCLUDING FERROUS METALS, COPPER AND COPPER ALLOYS, NICKEL-PLATED STEEL, MONEL, AND ALUMINUM	265,000 ft^2, 2600 yd^3	PENDING INVESTIGA-TION	M	INSTALLATION OF SEDIMENT CONTROLS TO MITIGATE SURFACE WATER /SEDIMENT RUNOFF FROM SCRAPYARDS.
15	C-746-C SCRAPYAR D	24	5302	R95C0021	STORAGE OF CLEAN SCRAP METAL FOR RESALE, UNCONTAMINATED SCRAP METAL, METAL TURNINGS FROM THE MACHINE SHOP OPERATIONS AND INGOTS FROM SMELTING OPERATIONS	250,000 ft^2	PENDING INVESTIGA-TION	M	INSTALLATION OF SEDIMENT CONTROLS TO MITIGATE SURFACE WATER /SEDIMENT RUNOFF FROM SCRAPYARDS.
16	C-746-D CLASSI-FIED SCRAPYAR D	14	5313	R95M0048	SCRAP METAL INCLUDING STEEL AND NICKEL-PLATED STEEL	59,400 ft^2 (180'x 330')	PENDING INVESTIGA-TION	M	
17	C-616-E SLUDGE LAGOON	12	5307	R95B0091	SLUDGE CONTAINING TRIVALENT CHROMIUM FROM THE C-616 WATER TREATMENT FACILITY	215,000 ft^2, depth 12.5 ft, EP-TOXICITY TESTED AND IS NONHAZARD-OUS	PENDING INVESTIGA-TION	M	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
18	C-616-F FULL FLOW LAGOON	12	5307	R95B0091	SOLIDS (CHROMIUM SLUDGE) FROM C-616-E AND SOME SOLIDS (PRIMARILY FLY ASH) FROM THE NSDD	366,000 ft^2 (285'x 1285'), depth 12 ft	PENDING INVESTIGA-TION	M	
19	C-410-B NEUTRALI-ZATION LAGOON	11	5303	R95M0044	EFFLUENT FROM THE C-410-C HF NEUTRALIZATION BUILDING WHICH IS USED FOR THE LIME NEUTRALIZATION OF HF CELL ELECTROLYTE AND LEAD-ACID BATTERIES. TRUCKS TRANSPORTING FLY ASH TO THE INERT LANDFILL ARE RINSED INTO THE IMPOUNDMENT	1940 ft^2 (38'x 51'), depth 7 ft	PENDING INVESTIGA-TION	L	
20	C-410-E HF EMERGEN-CY HOLDING POND	11	5303	R95M0044	NO KNOWN WASTE, NEVER USED FOR ORIGINAL PURPOSE	600 ft^2 (20'x 30"), depth 7 ft	PENDING INVESTIGA-TION	L	
21	C-611-V LAGOONS	13	5305	R95M0027	RECEIVES SLUDGE PRODUCED BY THE LIME-SODA SOFTENING AND FERRIC SULFATE COAGULATION PROCESSES AT THE C-611 PLANT.	64,000 ft^2 (80'x 800'), depth 12 ft	PENDING INVESTIGA-TION	L	
22	C-611-Y OVER-FLOW LAGOON	13	5305	R95M0027	OVERFLOW FROM C-611-V LAGOON	180,000 ft^2 (1200'x 150'), depth 5 ft	PENDING INVESTIGA-TION	L	
23	C-611-W SLUDGE LAGOON	13	5305	R95M0027	RECEIVES SLUDGE PRODUCED BY THE LIME-SODA SOFTENING AND FERRIC SULFATE COAGULATION PROCESSES AT THE C-611 PLANT.	9000 ft^2 (60'x 150'), depth 6 ft	PENDING INVESTIGA-TION		
24	C-750-D UNDER-GROUND STORAGE TANK	15	5307	R94H0052	WASTE OILS CONTAING PCBS. TANK WAS RINSED WITH TCE	8000 gal	PENDING INVESTIGA-TION	M	
25	C-750 1,000-GALLON WASTE OIL TANK						NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		

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26	C-400 TO C-404 UNDER-GROUND TRANSFER LINE	6	5310	R94F0057	AQUEOUS SOLUTIONS CONTAINING URANIUM AND OTHER RADIONUCLIDES	4 in steel line, 1500 ft long	PENDING INVESTIGA-TION	H	
27	C-722 ACID NEUTRALI-ZATION TANK	9	5306	R95M0042	INSTRUMENT SHOP RINSE WATERS	180 ft^2	PENDING INVESTIGA-TION	L	
28	C-712 ACID NEUTRALI-ZATION TANK	9	5306	R95M0042	LABORATORY WASTES INCLUDING ORGANICS, RADIONUCLIDES, METALS, AND OTHER MATERIALS	9'3"x 6'5"x 10'6" deep	PENDING INVESTIGA-TION	L	
29	C-746-B TRU STORAGE AREAS						NO FURTHER ACTION		
30	C-747-A BURN AREA	22	5302	R95M0028	COMBUSTIBLE TRASH	UNKNOWN	INVESTIGA-TION	H	
31	C-720 COMPRES-SOR PIT WATER STORAGE TANK	5	5303	R95M0045	WASTEWATER CONTAINING URANIUM FROM C-720 COMPRESSOR SHOP OPERATIONS	1000 gal CAPACITY	PENDING INVESTIGA-TION	L	
32	C-728 CLEAN WASTE OIL TANKS	23	5302	R94F0016	PRESENTLY USED FOR STORAGE OF CLEAN WASTE OIL. PREVIOUSLY USED FOR THE STORAGE OF MOTOR CLEANING SOLVENTS (MINERAL SPIRITS)	8000 gal, $000 gal	INVESTIGA-TION	H	
33	C-728 MOTOR CLEANING FACILITY	23	5302	R94F0016	MINERAL SPIRITS CONTAINING GREASE, OIL, AND URANIUM. AQUEOUS SOLUTIONS OF URANIUM, NaOH	UNKNOWN	INVESTIGA-TION	H	
34	C-746-M PCB WASTE STORAGE AREA						NO FURTHER ACTION		
35	C-337 PCB WASTE STORAGE AREA						NO FURHTER ACTION		
36	C-337 PCB WASTE STAGING AREA						NO FURTHER ACTION		
37	C-333 PCB WASTE STAGING AREA						NO FURTHER ACTION		

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38	C-615 SEWAGE TREAT-MENT PLANT	29			SANITARY SEWAGE	200x 100 ft, 400,000 gal/day	PENDING INVESTIGA-TION		
39	C-746-B PCB WASTE STORAGE AREA						NO FURTHER ACTION		
40	C-403 NEUTRAL-IZATION TANK	6	5310	R94F0057	CURRENTLY USED FOR THE COLLECTION OF UF_6 CYLINDER HYDROSTATIC TEST WATER AND AREA RUNOFF. PREVIOUSLY USED FOR HOLD-UP /NEUTRALIZATION OF URANIUM-BEARING WASTE SOLUTIONS.	24'4" square, 18' deep	PENDING INVESTIGA-TION	H	
41	C-410-C NEUTRALI-ZATION TANK	11	5303	R95M0044	WASTE FLUORINE CELL ELECTROLYTE (HF) AND BATTERY ACID	CYLINDRI-CAL, 7'8" diameter, 9'10" depth	PENDING INVESTIGA-TION	L	
42	C-616 CHROMAT E REDUC-TION FACILITY	12	5307	R95B0091	COOLING WATER CONTAINING HEXAVALENT CHROMIUM, URANIUM AND PCBS HAVE BEEN DETECTED.	CLARIFIERS - 128' diameter	PENDING INVESTIGA-TION	M	
43	C-746-B WASTE CHEMICAL STORAGE AREA						REGULATED BY THE RCRA PERMIT		
44	C-733 HAZARD-OUS WASTE STORAGE AREA						REGULATED BY THE RCRA PERMIT		
45	C-746-R WASTE SOLVENT STORAGE AREA						REGULATED BY THE RCRA PERMIT		
46	C-409 HAZARD-OUS WASTE PILOT PLANT					5000 sq ft	REGULATED BY THE RCRA PERMIT		

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46A	C-746-Q HAZARD-OUS AND LOW-LEVEL WASTE STORAGE BUILDING						REGULATED BY THE RCRA PERMIT		
47	C-400 TECHNE-TIUM STORAGE TANK AREA	6	5310	R94F0057	AQUEOUS WASTE CONTAINING CHROMIUM AND Tc-99	APPROXI-MATELY 200 gal IN A 4,000 gal TANK	PENDING INVESTIGA-TION	H	
48	C-400-A GOLD DISSOLVER STORAGE TANK				GOLD DISSOLVER PROCESS WASTE CONTAINING ACIDS AND METALS	5000 gal CAPACITY	NO FURTHER ACTION		
49	C-400-B WASTE SOLUTION STORAGE TANK				WASTE SOLUTION AS DESCRIBED IN THE RCRA PERMIT	5000 gal TANK	REGULATED BY THE RCRA PERMIT		
50	C-400-C NICKEL STRIPPER EVAPORA-TION TANK				NICKEL STRIPPER WASTE SOLUTION	100 gal TANK; 4 - 55 gal drums	REGULATED BY THE RCRA PERMIT		
51	C-400-D LIME PRECIPITA-TION TANK				WASTE AQUEOUS SOLUTIONS CONTAINING METALS AND URANIUM. TREATED SOLUTIONS ARE ACIDIC	5000 gal			
52	C-400 WASTE DECONTA MI-NATION SOLUTION STORAGE TANKS				WASTE DECONTAMINATION SOLUTIONS CONTAINING URANIUM	20" diameter, 22' tall, MULTIPLE TANKS, 4680 gal	NO FURTHER ACTION		
53	C-400 NaOH PRECIPITA-TION TANK				WASTE SOLUTION CONTAINING URANIUM	20" diameter, 10' tall, 640 gal	NO FURTHER ACTION		
54	C-400 DEGREASE R SOLVENT RECOVERY UNIT				SPENT TRICHLOROETHYL-ENE/1,1,1-TRICHLOROETHANE	2' wide x 4' longx 5' high, 300 gal	NO FURTHER ACTION		
55	C-405 INCINERA-TOR	30			RADIONUCLIDE CONTAMINATED AND UNCONTAMINATED WASTES	20'x 30'	PENDING INVESTIGA-TION		
56	C-540-A PCB WASTE STAGING AREA	23	5302	R94F0016	PCB CONTAMINATED OILS AND SOLIDS	5'x 10', SIX 55-gal drums	INVESTIGA-TION	H	

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57	C-541-A PCB WASTE STAGING AREA	23	5302	R94F0016	PCB CONTAMINATED OILS AND SOLIDS	5'x 10', SIX 55-gal drums	INVESTIGA-TION	H	
58	NORTH-SOUTH DIVERSION DITCH (OUTSIDE PLT SECURITY AREA)	25	5302	R95B0096	STORM WATER AND WASTE STREAMS CONTAINING RADIONUCLIDES	1 MILE	PENDING INVESTIGA-TION	H	INSTITUTED ACTION TO TREAT CERTAIN PLANT EFFLUENT AND CONTROL THE MIGRATION OF CONTAMINAT-ED SEDIMENT ASSOCIATED WITH THE N-S DIVERSION DITCH.
59	NORTH-SOUTH DIVERSION DITCH (INSIDE PLT SECURITY AREA)	25	5302	R95B0096	DURING EARLY YEARS OF OPERATION, SOLUTIONS CONTAINING URANIUM AND OTHER RADIONUCLIDES WERE DISCHARGED TO THE DITCH. MORE RECENTLY THE C-400 EFFLUENT HAS BEEN TREATED PRIOR TO DISCHARGE. COAL PILE RUNOFF AND FLY ASH FROM C-600 ARE ALSO DISCHARGED TO THE DITCH.	1/2 MILE	PENDING INVESTIGA-TION	H	INSTITUTED ACTION TO TREAT CERTAIN PLANT EFFLUENT AND CONTROL THE MIGRATION OF CONTAMINAT-ED SEDIMENT ASSOCIATED WITH THE N-S DIVERSION DITCH.
60	C-375-E2 EFFLUENT DITCH (KPDES 002)	25	5302	R95B0096	STORM WATER, POSSIBLY CHROMATED WATER		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
61	C-375-E5 EFFLUENT DITCH (KPDES 013)	25	5302	R95B0096	STORM WATER, POSSIBLY CHROMATED WATER		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.

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62	C-375-S6 SOUTH-WEST DITCH (KPDES 009)	18	5310	R95M0043	STORM WATER, LABORATORY WASTE WATER FROM C-710 OPERATIONS, SOME C-720 EFFLUENTS.		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
63	C-375-W7 OIL SKIMMER DITCH (KPDES 008)	18	5310	R95M0043	STORM WATER, OIL FROM THE C-600 AIR COMPRESSOR PLANT, TREATED EFFLUENT FROM C-615 SEWAGE TREATMENT PLANT.		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
64	LITTLE BAYOU CREEK	25	5302	R95B0096	RCW BLOWDOWN (CONTAINING CHROMIUM), STORM WATER	3 MILES	PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
65	BIG BAYOU CREEK	18	5310	R95M0043	STORM WATER, SEWAGE TREATMENT PLANT EFFLUENTS, EFFLUENTS FROM THE C-616 CHROMIUM REDUCTION FACILITY.	3 MILES	PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
66	C-375-E3 EFFLUENT DITCH (KPDES 010)	25	5302	R95B0096	STORM WATER, POSSIBLY SOME CHROMATED WATER, C-340 EFFLUENTS.		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
67	C-375-E4 EFFLUENT DITCH (C-340 DITCH)	25	5302	R95B0096	STORM WATER, POSSIBLY SOME CHROMATED WATER.		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.

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68	C-375-W8 EFFLUENT DITCH (KPDES 015)	18	5310	R95M0043	STORM WATER, POSSIBLY SOME CHROMATED WATER.		PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
69	C-375-W9 EFFLUENT DITCH (KPDES 001)	18	5310	R95M0043	STORM WATER	2000 ft	PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS.
70	C-333-A VAPORIZ-ER	30			HYDRAULIC OILS CONTAINING PCBS	UNKNOWN	PENDING INVESTIGA-TION		
71	C-337-A VAPORIZ-ER	30			HYDRAULIC OILS CONTAINING PCBS	UNKNOWN	PENDING INVESTIGA-TION		
72	C-200 UNDER-GROUND GASOLINE TANKS	4			GASOLINE	200 gal TANK, 500 gal TANK	NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		
73	C-710 UNDER-GROUND GASOLINE TANKS	4			GASOLINE	200 gal TANK	NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		
74	C-340 PCB SPILL SITE	23	5302	R94F0016	PCBS	UNKNOWN	INVESTIGA-TION	H	
75	C-633 PCB SPILL SITE	19	5302	R95C0018	PCBS	UNKNOWN	INVESTIGA-TION	M	
76	C-632-B H_2SO_4 STORAGE TANK	5	5303	R95M0045	SULFURIC ACID	5000 gal capacity	PENDING INVESTIGA-TION	L	
77	C-634-B H_2SO_4 STORAGE TANK	5	5303	R95M0045	SPILLED SULFURIC ACID	5000 gal capacity	PENDING INVESTIGA-TION	L	
78	C-420 PCB SPILL SITE	16	5308	R95B0092	PCBS	UNKNOWN	PENDING INVESTIGA-TION	M	
79	C-611 PCB SPILL SITE	23	5302	R94F0016	PCBS	UNKNOWN	INVESTIGA-TION	H	
80	C-540 PCB SPILL SITE	23	5302	R94F0016	PCBS	UNKNOWN	INVESTIGA-TION	H	

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81	C-541 PCB SPILL SITE	23	5302	R94F0016	PCBS	UNKNOWN	INVESTIGA-TION	H	
82	C-531 SWITCH-YARD	8	5306	R95M0041	CHLORINATED SOLVENTS	390'x 430'	PENDING INVESTIGA-TION	L	
83	C-533 SWITCH-YARD	8	5306	R95M0041	CHLORINATED SOLVENTS, PCBS	390'x 690'	PENDING INVESTIGA-TION	L	
84	C-535 SWITCH-YARD	8	5306	R95M0041	CHLORINATED SOLVENTS, PCBS	430'x 460'	PENDING INVESTIGA-TION	L	
85	C-537 SWITCH-YARD	8	5306	R95M0041	CHLORINATED SOLVENTS, PCBS	720'x 440'	PENDING INVESTIGA-TION	L	
86	C-631 PUMP HOUSE AND COOLING TOWER	2	5313	R95M0046	POSSIBLY CHROMATED WATER	EAST BASIN - 1,873,048 gal WEST BASIN - 1,873,048 gal WET WELL - 633,312 gal	PENDING INVESTIGA-TION	L	
87	C-633 PUMP HOUSE AND COOLING TOWER	2	5313	R95M0046	POSSIBLY CHROMATED WATER	NORTH BASIN - 4,045,767 gal SOUTH BASIN - 4,045,767 gal WET WELL - 791,789 gal	PENDING INVESTIGA-TION	L	
88	C-635 PUMP HOUSE AND COOLING TOWER	2	5313	R95M0046	POSSIBLY CHROMATED WATER	NORTH BASIN - 1,769,648 gal SOUTH BASIN - 1,769,648 gal WET WELL - 66, 314 gal	PENDING INVESTIGA-TION	L	
89	C-637 PUMP HOUSE AND COOLING TOWER	2	5313	R95M0046	POSSIBLY CHROMATED WATER	NORTH BASIN - 4,220,417 gal SOUTH BASIN - 4,220,417 gal WET WELL - 791,789 gal	PENDING INVESTIGA-TION	L	
90	C-720 UNDER-GROUND PETRO-LEUM NAPTHA PIPE						NO FURTHER ACTION		
91	UF_6 CYLINDER DROP TEST AREA	27	5302	R95B0094	TCE	12x 5 ft	PENDING INVESTIGA-TION	H	
92	FILL AREA FOR DIRT FROM C-420 PCB SPILL SITE	19	5302	R95C0018	PCBS	UNKNOWN	PENDING INVESTIGA-TION	M	
93	CONCRETE DISPOSAL AREA EAST OF PLANT SECURITY AREA	17	5309	R94F0024	CONCRETE	UNKNOWN	INVESTIGA-TION	H	

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94	KOW TRICKLING FILTER AND LEACH FIELD	10			SEMIVOLATILES	75' in diameter (CLARIFIER)	THE CORPS OF ENGINEERS IS TO TAKE OVER RESPONSI-BILITY OF THE FORMER KOW SITES.		
95	KOW BURN AREA	10			TNT, SEMIVOLATILES, TCE, CARBON TETRACHLORIDE, AND TOLUENE	UNKNOWN	THE CORPS OF ENGINEERS IS TO TAKE OVER RESPONSI-BILITY OF THE FORMER KOW SITES.		
96	COOLING TOWER SCRAP WOOD PILE						NO FURTHER ACTION		
97	C-601 DIESEL SPILL (previously AOC #A)	15	5307	R94H0052	DIESEL FUEL	UNKNOWN, APPROXI-MATELY 17,000gal WAS SPILLED	PENDING INVESTIGA-TION	M	
98	C-400 BASEMENT SUMP (previously AOC #B)	30			TCE, Tc-99	2' diameter SUMP	PENDING INVESTIGA-TION		
99	C-745 KELLOG BUILDING SITE (previously AOC #C)	28	5302	R95B0095	POSSIBLY TCE	320' WIDE BY 480' LONG	PENDING INVESTIGA-TION	H	
100	FIRE TRAINING AREA (previously AOC #D)	1	5304	R94F0058	POSSIBLY TCE OR PCB-CONTAMINATED WASTE OILS AND SOLVENTS	20'x 20'	INVESTIGA-TION	H	
101	C-340 HYDRAU-LIC SYSTEM (previously AOC #E)	30			PCB CONTAMINATED OIL	50 gal	PENDING INVESTIGA-TION		
102	PLANT STORM SEWER (previously 96a, 96b, and 96c)	29			POSSIBLY PCB AND RADIOLOGICAL CONTAMINATION	UNKNOWN	PENDING INVESTIGA-TION		
103	CONCRETE RUBBLE PILE (1)	17	5309	R94F0024	DIRT, GRAVEL, AND CONCRETE SPOIL	250' long, 12' deep, and 20' wide, 2500 cu yds	INVESTIGA-TION	H	
104	CONCRETE RUBBLE PILE (2)	17	5309	R94F0024	CONCRETE SPOIL	200' long, 15' wide, and 10' deep,	INVESTIGA-TION	H	

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105	CONCRETE RUBBLE PILE (3)	17	5309	R94F0024	CONCRETE SLABS	DAM APPROX. 20' long and 10' wide - CONCRETE IN AND ON DAM APPROX. 150 sq ft OF CONCRETE VISIBLE, APPROX. 50 cu yds	INVESTIGA-TION	H	
106	CONCRETE RUBBLE PILE (4)	17	5309	R94F0024	CONCRETE SLABS	DAM APPROX. 25 long and 15 wide - CONCRETE IN AND ON DAM FACE, APPROX 5 cu yds	INVESTIGA-TION	H	
107	CONCRETE RUBBLE PILE (5)	17	5309	R94F0024	CONCRETE SLABS	DAM APPROX. 30' long and 20' wide - CONCRETE IN AND ON DAM FACE, APPROX. 225 cu yds OF DAM FILL AND 450 sq ft OF CONCRETE VISIBLE	INVESTIGA-TION	H	
108	CONCRETE RUBBLE PILE (6)	17	5309	R94F0024	CONCRETE SLABS	20' long, 20' wide, and 10" deep, 150 cu yds OF FILL, 100 cu yds OF CONCRETE IN THE CULVERT	INVESTIGA-TION	H	
109	CONCRETE RUBBLE PILE (7)	17	5309	R94F0024	CONCRETE SLABS, RUBBLE	APPROX 500 sq ft	INVESTIGA-TION	H	
110	CONCRETE RUBBLE PILE (8)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 200 cu yds	INVESTIGA-TION	H	
111	CONCRETE RUBBLE PILE (9)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 1500 cu yds	INVESTIGA-TION	H	
112	CONCRETE RUBBLE PILE (10)	17	5309	R94F0024	CONCRETE RUBBLE	UNKNOWN	INVESTIGA-TION	H	
113	CONCRETE RUBBLE PILE (11)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 10 cu yds	INVESTIGA-TION	H	
114	CONCRETE RUBBLE PILE (12)	17	5309	R94F0024	CONCRETE SLABS AND RUBBLE	APPROX. 40 cu yds, 35' long, 20 " wide, and 3 to 6' deep	INVESTIGA-TION	H	
115	CONCRETE RUBBLE PILE (13)	17	5309	R94F0024	CONCRETE SLABS, RUBBLE	APPROX. 1000 cu yds	INVESTIGA-TION	H	
116	CONCRETE RUBBLE PILE (14)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 30 cu yds, 20'x 50 '	INVESTIGA-TION	H	

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117	CONCRETE RUBBLE PILE (15)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 15 cu yds	INVESTIGA-TION	H	
118	CONCRETE RUBBLE PILE (16)	17	5309	R94F0024	CONCRETE SLABS, RUBBLE	APPROX. 20 cu yds, 4'x 120'	INVESTIGA-TION	H	
119	CONCRETE RUBBLE PILE (17)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 5 cu yds	INVESTIGA-TION	H	
120	CONCRETE RUBBLE PILE (18)	17	5309	R94F0024	CONCRETE SLABS, RUBBLE	APPROX. 10 cu yds	INVESTIGA-TION	H	
121	CONCRETE RUBBLE PILE (19)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 1 cu yd	INVESTIGA-TION	H	
122	CONCRETE RUBBLE PILE (20)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 10 cu yds	INVESTIGA-TION	H	
123	CONCRETE RUBBLE PILE (21)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 500 TO 1000 cu yds, 250'x 350', 1' - 5' depth	INVESTIGA-TION	H	
124	CONCRETE RUBBLE PILE (22)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 20 cu yds, 200'x 300'	INVESTIGA-TION	H	
125	CONCRETE RUBBLE PILE (23)	17	5309	R94F0024	CONCRETE CURBING, RAILROAD SPOIL	APPROX. 5 AND 50 cu yds, RESPECTIVE-LY	INVESTIGA-TION	H	
126	CONCRETE RUBBLE PILE (24)	17	5309	R94F0024	CONCRETE RUBBLE	LESS THAN 1 cu yd	INVESTIGA-TION	H	
127	CONCRETE RUBBLE PILE (25)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 10 cu yds, 20' wide x 25' long, and 2 to 16' deep	INVESTIGA-TION	H	
128	CONCRETE RUBBLE PILE (26)	17	5309	R94F0024	CONCRETE SLABS	APPROX. 20 cu yds	INVESTIGA-TION	H	
129	CONCRETE RUBBLE PILE (27)	17	5309	R94F0024	CONCRETE SLABS, RUBBLE	APPROX. 3 cu yds	INVESTIGA-TION	H	
130	C-611 UST - 550 GALLON GAS TANK (WEST OF C-611)	7	5304	R94F0058	GASOLINE	550 gal CAPACITY	INVESTIGA-TION	H	
131	C-611 UST - 50 GALLON GAS TANK (EAST OF C-611)	7	5304	R94F0058	GASOLINE	50 gal CAPACITY	INVESTIGA-TION	H	
132	C-611 UST - 2000 GALLON OIL TANK (NORTH OF C-611)	7	5304	R94F0058	FUEL OIL	2000 gal CAPACITY	INVESTIGA-TION	H	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
133	C-611 UNDER-GROUND STORAGE TANK	7	5304	R94F0058	DIESEL	UNKNOWN	INVESTIGA-TION	H	
134	C-611 UST - 1000 GALLON DIESEL /GAS TANK (SOUT-HEAST OF C-611)	7	5304	R94F0058	DIESEL	1000 gal CAPACITY	INVESTIGA-TION	H	
135	C-333 PCB SOIL CONTAM-INATION (NORTH SIDE OF C-333)	19	5302	R95C0018	PCB	150'x 100'	PENDING INVESTIGA-TION	M	
136	C-740 TCE SPILL SITE (NORT-HWEST CORNER, C-740 CONCRETE PAD)	1	5304	R94F0058	TCE	5'x 5'	INVESTIGA-TION	H	
137	C-746-A INACTIVE PCB TRANS-FORMER/ SUMP	16	5308	R95B0092	POSSIBLE PCB CONTAMINATED WATER	12' long x 3' widex 3' deep	PENDING INVESTIGA-TION	M	
138	C-100 SOUTH SIDE BERMS (C-611/615 SLUDGE ?)	21	5302	R95C0020	MERCURY AND LEAD	2 BERMS APPROX. 100' long x 50' wide	PENDING INVESTIGA-TION	M	
139	C-746-A1 (UST)	15	5307	R94H0052	DIESEL	4000 gal	PENDING INVESTIGA-TION	M	
140	C-746-A2 (UST)	15	5307	R94H0052	DIESEL	4000 gal	PENDING INVESTIGA-TION	M	
141	C-720 INACTIVE TCE DEGREASE R				TCE	APPROX. 10'x 10'x 20' deep	NO FURTHER ACTION		
142	C-750-A (GASOLINE UST)				GASOLINE	10,000 gal tank	NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
143	C-750-B (DIESEL UST)	4			DIESEL	10,000 gal tank	NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		
144	C-746-A HAZARD-OUS AND MIXED WASTE STORAGE FACILITY	4					REGULATED BY THE RCRA PERMIT		
145	RESIDEN-TIAL/INERT LANDFILL BARROW AREA	21	5302	R95C0020	ROOF SHINGLES CONTAINING ASBESTOS, WIRE, AND WOOD	25'x 25'	NO FURTHER ACTION	M	
146	CONCRETE RUBBLE PILE (40)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX. 2000 cu yds, 200' long, BASE 300' wide, TOP 20' wide, 10' deep	NO FURTHER ACTION	H	
147	CONCRETE RUBBLE PILE (41)	17	5309	R94F0024	CONCRETE RUBBLE	200' long, base 300' wide, top 20' wide, 10' deep, APPROX. 2000 cu yds	NO FURTHER ACTION	H	
148	CONCRETE RUBBLE PILE (42)	17	5309	R94F0024	CONCRETE RUBBLE	2 AREA TOTAL APPROX. 100' long, LESS THAN 20 cu yds	NO FURTHER ACTION	H	
149	CONCRETE RUBBLE PILE (43)	17	5309	R94F0024	CONCRETE SLABS	200' longx 4' wide, 4-6" thick, APPROX. 15 cu yds	NO FURTHER ACTION	H	
150	CONCRETE RUBBLE PILE (44)	17	5309	R94F0024	CONCRETE RUBBLE	300' long, base 30' wide, top 20' wide, 10' deep, POSSIBLY UP TO 3000 cu yds	NO FURTHER ACTION	H	
151	CONCRETE RUBBLE PILE (45)	17	5309	R94F0024	CONCRETE RUBBLE	2000' long, 4' wide, 1' thick, APPROX. 3000 cu yds	NO FURTHER ACTION	H	
152	CONCRETE RUBBLE PILE (46)	17	5309	R94F0024	CONCRETE RUBBLE	100'x 100'', APPROX. 50 cu yds	NO FURTHER ACTION	H	
153	C-331 PCB SOIL CONTAM-INATION - WEST SIDE	16	5308	R95B0092	PCB	100' wide x 420' long,	PENDING INVESTIGA-TION	M	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
154	C-331 PCB SOIL CONTAMI-NATION - SOUTH-EAST SIDE	19	5302	R95C0018	PCB	AREA 1 - SOUTH SIDE 100' wide x 160' long; AREA 2 - SOUTHEAST CORNER 100' wide x 160' long; AREA 3 - EAST SIDE 100' widex 210' long	PENDING INVESTIGA-TION	M	
155	C-333 PCB SOIL CONTAM-INATION - WEST SIDE	16	5308	R95B0092	PCB	2 AREAS APPROX. 100' wide x 150' long EACH	PENDING INVESTIGA-TION	M	
156	C-310 PCB SOIL CONTAM-INATION - WEST SIDE		5308	R95B0092	PCB	100' wide x 160' long		M	
157	KOW TOLUENE SPILL AREA	10			TOLUENE	200' wide x 800" long	THE CORPS OF ENGINEERS IS TO TAKE OVER RESPONSIBI L-ITY OF THE FORMER KOW SITES.		
158	CHILLED WATER SYSTEM LEAK SITE	21	5302	R95C0020	CHROMATED WATER	APPROX. 3500 gal, 10' wide x 30' long	PENDING INVESTIGA-TION	M	
159	C-746-H3 STORAGE PAD	29			SOIL CUTTINGS, DRILL MUD, PURGE AND DEVELOPMENT WATER, PERSONAL PROTECTIVE EQUIPMENT, AND DECON WATER ARE STORED IN CONTAINERS (DRUMS AND TANKS) ON THE PAD.	170' wide x 350' long	PENDING INVESTIGA-TION		
160	C-745 CYLINDER YARD SPOILS AREA - PCB SOIL CONTAM-INATION	19	5302	R95C0018	POSSIBLE PCB IN SOIL	300' wide x 500 ' long	PENDING INVESTIGA-TION	M	
161	C-743-T01 TRAILER SITE - SOIL BACKFILL	16	5308	R95B0092	POSSIBLE PCB IN SOIL	200' wide x 200' long	PENDING INVESTIGA-TION	M	
162	C-617-A SANITARY WATER LINE - SOIL BACKFILL	19	5302	R95C0018	POSSIBLE PCB IN SOIL	4' deep x 250' long	PENDING INVESTIGA-TION	M	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
163	C-304 BUILDING /HVAC-PIPING SYSTEM - SOIL BACKFILL	19	5302	R95C0018	POSSIBLE PCB IN SOIL	100' wide x 200' long	PENDING INVESTIGA-TION	M	
164	KPDES OUTFALL DITCH 017 FLUME - SOIL BACKFILL	16	5308	R95B0092	POSSIBLE PCB CONTAMINATED SOIL	30' wide x 30' long	PENDING INVESTIGA-TION	M	
165	C-616-L PIPELINE AND VAULT SOIL CONTAM-INATION	9	5306	R95M0042	POSSIBLE PCBS, URANIUM, AND Tc-99	AREA 1 - 105' wide x 210' long; AREA 2 - 30' wide x 130'	PENDING INVESTIGA-TION	L	
166	C-100 TRAILER COMPLEX SOIL CONTAM-INATION (EAST SIDE)	20	5302	R95C0019	Tc-99	100' wide x 150' long	PENDING INVESTIGA-TION	L	
167	C-720 WHITEROO M SUMP	30			POSSIBLE CONTAMINANTS INCLUDE CYANIDES, GOLD, SILVER, TIN, LEAD, AND CHROMIUM	8' deepx 6' wide x 8' long	PENDING INVESTIGA-TION		
168	KPDES OUTFALL DITCH 012	25	5302	R95B0096	STORM WATER AND SEDIMENTS POTENTIALLY CONTAMINATED WITH CHROMATES AND LOW LEVELS OF DIOXINS	1500'	PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS
169	C-410-E HF VENT SURGE PROTEC-TION TANK	5	5303	R95M0045	POSSIBLY PRESENCE OF CHROMIUM	150 gal	PENDING INVESTIGA-TION	L	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
170	C-729 ACETY-LENE BUILDING DRAIN PITS	9	5306	R95M0042	ACETYLENE WAS GENERATED FOR MAINTENANCE ACTIVITIES BY COMBINING CALCIUM CARBIDE AND WATER. THE RESIDUE FROM THE OPERATION DRAINED TO TWO OUTSIDE CONCRETE PITS. STANDPIPES IN THE PITS ALLOWED THE SEDIMENTS TO SETTLE OUT WITH THE EFFLUENT DRAINING TO THE STORM WATER SEWER SYSTEM.	APPROX. 16' long x 8' wide x 3' deep	PENDING INVESTIGA-TION	L	
171	C-617-A LAGOON	25	5302	R95B0096	EFFLUENT FROM THE OUTFALL DITCHES 002, 010, 012 IS ROUTED TO THE LAGOON WHERE SODIUM THIOSULFATE IS ADDED FOR CHLORINE REDUCTION. THE EFFLUENT IS THEN DISCHARGED THROUGH OUTFALL 010 OR 011..	130' long x 70' wide	PENDING INVESTIGA-TION	H	INSTITUTIONAL CONTROLS (FENCING /POSTING) FOR OFF-SITE CONTAMINA-TION IN SURFACE WATER, OUTFALLS AND LAGOONS
172	C-726 SAND-BLAST-ING FACILITY	20	5302	R95C0019	CLEANING AND SANDBLASTING PLANT EQUIPMENT..	45' long x 40' wide	PENDING INVESTIGA-TION	L	
173	C-746-A TRASH SORTING FACILITY				SANITARY WASTE	6916 sq ft	NO FURTHER ACTION		
174	C-745-K LOW LEVEL STORAGE AREA				STORAGE AREA FOR DRUMS WHICH CONTAIN LOW LEVEL WASTE	215' long x 103' wide	NO FURTHER ACTION		
175	CONCRETE RUBBLE PILE (28)	17	5309	R94F0024	CONCRETE RUBBLE	400' long x 20' wide	INVESTIGA-TION	H	
176	C-331 RCW LEAK NORTH-WEST SIDE	21	5302	R95C0020	RCW CONTAINING 8.4 PPM HEXAVALENT CHROMIUM	75' x 75'	PENDING INVESTIGA-TION	M	
177	C-331 RCW LEAK EAST SIDE	21	5302	R95C0020	RCW CONTAINING 9.9 PPM HEXAVALENT CHROMIUM	100' long x 75' wide	PENDING INVESTIGA-TION	M	
178	C-724-A PAINT SPRAY BOOTH	29			PCBS RANGING FROM 0.3 TO 4.0 PPB HAVE BEEN IDENTIFIED AS PRESENT IN THE WATER	3' deep x 15' wide x 8' high	PENDING INVESTIGA-TION		

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
179	PLANT SANITARY SEWER SYSTEM	29			UNKNOWN	UNKNOWN	PENDING INVESTIGA-TION		
180	OUTDOOR FIRING RANGE (WKWMA)	21	5302	R95C0020	LEAD	480'x 300'	PENDING INVESTIGA-TION	M	
181	OUTDOOR FIRING RANGE (PGDP)	21	5302	R95C0020	LEAD	210'x 180'	PENDING INVESTIGA-TION	M	
182	KOW STANDPIPE	10			TNT ISOMERS, NITRIC AND SULFURIC ACID	3' high x 3' in diameter	THE CORPS OF ENGINEERS IS TO TAKE OVER RESPONSI-BILITY OF THE FORMER KOW SITES.		
183	McGRAW UST	28	5302	R95B0095	WASTE OIL	400 gal	PENDING INVESTIGA-TION	H	
184	CONCRETE RUBBLE PILE (29)	17	5309	R94F0024	CONCRETE	APPROX 5 cu ft	INVESTIGA-TION	H	
185	C-611-4 HORSE-SHOE LAGOON	13	5305	R95M0027	METALS WITH LEAD BEING THE MAIN CONCERN. BULK LEAD CONCENTRATIONS RANGED FROM 56.6 PPM TO 815.0 PPM.	80' long x 71' wide x 8'deep	PENDING INVESTIGA-TION	L	
186	C-751 FUEL FACILITY				1,1 DICHLOROETHANE	TWO 10,000 gal UST	NO FURTHER ACTION. UNIT WILL BE ADDRESSED BY KY'S UST PROGRAM (SUBTITLE I).		
187	C-611 SEPTIC SYSTEM				DOMESTIC SEWAGE	50' wide x 50' long	NO FURTHER ACTION		
188	C-633 SEPTIC SYSTEM				DOMESTIC SEWAGE	50' wide x 200' long	NO FURTHER ACTION		
189	C-637 SEPTIC SYSTEM				DOMESTIC SEWAGE	50' wide x 100' long	NO FURTHER ACTION		
190	C-337-A SEWAGE TREAT-MENT AERATION TANK				DOMESTIC SEWAGE	750 gal	NO FURTHER ACTION		
191	C-333-A SEWAGE TREAT-MENT AERATION TANK				DOMESTIC SEWAGE	750 gal	NO FURHTER ACTION		

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
192	C-710 ACID INTERCEP-TOR PIT	30			PCB (AROCLOR 1248), 470 PPM; CARBON TETRACHLORIDE (TCLP EXTRACT), 6.3 PPM; TCE (TCLP EXTRACT), 200 PPM; URANIUM (TOTAL), 161 pCi/g; URANIUM (ASSAY), 0.26 wt% U-235; Tc-99, 35 pCi/g.	3' diameter x 4' deep	PENDING INVESTIGA-TION		
193	McGRAW CONST. FACILITIES (SOUTH-SIDE, CYLINDER YARDS)	28	5302	R95B0095	POSSIBLE CONTAMINANTS OF CONCERN ARE TCE AND PCBS	720' wide x 1500' long	PENDING INVESTIGA-TION	H	
194	McGRAW CONST. FACILITIES (SOUTH-SIDE)	28	5302	R95B0095	POSSIBLE CONTAMINANTS OF CONCERN ARE TCE AND PCBS	600' wide x 900' long	PENDING INVESTIGA-TION	H	
195	CURLEE ROAD CONTAMIN AT-ED SOIL MOUNDS	20	5302	R95C0019	POSSIBLE CONTAMINANTS OF CONCERN ARE RADIONUCLIDES; THIS IS BASED ON SAMPLING INFORMATION FROM THE DITCHES	MOUND 1 - 282,600 sq ft MOUND 2 - 86,400 sq ft	PENDING INVESTIGA-TION	L	
196	C-746-A SEPTIC TANK	27	5302	R95B0094	SYSTEM 1 - TANK USED TO PROCESS SANITARY WASTE FROM C-746-A SYSTEM 2 - CONCRETE TANK AND DRAINAGE FIELD USED TO PROCESS THE SANITARY WASTE FROM C-746-A	SYSTEM 1 - 500 gal TANK SYSTEM 2 - 950 gal CONCRETE TANK AND DRAINAGE FIELD 60'x 20'	PENDING INVESTIGA-TION	H	
197	CONCRETE RUBBLE PILE (30)	17	5309	R94F0024	CONCRETE RUBBLE	APPROX 1 cu yd	INVESTIGA-TION	H	
198	C-410-D AREA SOIL CONTAM-INATION	30			SOILS CONTAINING DETECTABLE LEVELS OF PCBS AND RADIONUCLIDES	APPROX. 40'x 60'	PENDING INVESTIGA-TION		
199	BIG BAYOU MONITOR-ING STATION	18	5310	R95M0043	ESTIMATE OF MERCURY SPILLED WAS 100 ml	STATION IS APPROX. 8' wide x 8" long x 8' tall	PENDING INVESTIGA-TION	H	
200	SOIL CONTAM-INATION SOUTH OF TSCA WASTE STORAGE FACILITY	20	5302	R95C0019	POSSIBLY USED AS A SPOILS AREA. AREA SAMPLING INDICATED ELEVATED CONCENTRATIONS OF PCBS AND RADIONUCLIDES	282' wide x 304' long	PENDING INVESTIGA-TION	L	

SWMU/ AOC No.	Activity Name Description	Waste Area Group (WAG)	Activity Data Sheet No.	Risk Data Sheet No.	Hazards and Contaminants	Acres, Area, or Volumes	Phase	Relative Ranking	Cleanup Actions Completed
201	NORTH-WEST GW PLUME	26	5302	R95B0097	TCE AND Tc-99		INTERIM REMEDIAL ACTION	H	
202	NORTH-EAST GW PLUME	26	5302	R95B0097	TCE AND Tc-99		INTERIM REMEDIAL ACTION	H	
203	C-400 SUMP	6	5310	R94F0057	SLUDGE CONTAINS PCBS, TCE, AND RADIOLOGICAL CONSTITUENTS	SUMP IS APPROX. 4' IN diameter x 1/2 ft deep	PENDING INVESTIGA-TION	H	
204	DYKES ROAD HISTORI-CAL STAGING AREA	28	5302	R95B0095	TCE	500'x 700"	PENDING INVESTIGA-TION	H	

insert figure 3-1-1b

insert Figure 3-1-2

The CERCLA/ACO site investigation, completed in 1991, determined off-site contaminants in the regional gravel aquifer to be TCE, an industrial degreasing solvent, and Tc-99, a fission by-product contained in nuclear power reactor returns that were brought on-site several years ago for re-enrichment. PCBs and radionuclides are primary contaminants detected in surface water and sediment in outfalls, ditches, and creeks around PGDP. An isoconcentration map illustrating TCE and Tc-99 concentrations for the RGA is included as **Figure 3-1-3**. Although PCBs are also contaminants of concern at PGDP, isoconcentration maps are not included since sample results have not shown definitive patterns or isoconcentrations. **Figure 3-1-4** illustrates analytical results of PCB sampling.

insert figure 3-1-3(TCE and Tc-99)

insert figure 3-1-4 (PCB)

3.2 REGULATORY AGREEMENTS, CONSENT DECREES, COMPLIANCE, AND OTHER LEGAL DRIVERS

The EM Program at PGDP is driven by several environmental laws and regulations. In general, these include the CERCLA, the Clean Water Act (CWA), the National Environmental Policy Act (NEPA),the RCRA (KRS 224), and the Toxic Substances Control Act (TSCA). The specific requirements of these statutes are further defined through site-specific permits, enforcement orders, and compliance agreements. Although all these regulations impact the EM Program to some degree, RCRA and CERCLA are considered the primary regulations that currently drive the majority of investigation and remediation activities at the site (see **Figure 3-2-1**).

Several agreements and permits between EPA, the state, and DOE that directly affect the Paducah EM and Enrichment Facilities Program include:

RCRA Permits. The primary purpose of RCRA is to protect human health and the environment through the proper management of both hazardous and nonhazardous wastes from the generation of the waste to its disposal. RCRA Subtitle D contains the regulatory provisions for the management of nonhazardous solid wastes, while RCRA Subtitle C regulates the management of hazardous wastes. In 1984, RCRA was significantly expanded when Congress signed HSWA into law. HSWA added several new requirements to Subtitle C including land disposal restrictions, provisions for waste minimization and air emissions monitoring, UST maintenance and remediation, and requirements to conduct corrective action for environmental releases at SWMUs.

RCRA requirements for PGDP are contained in two separate but related permits. These include a Hazardous Waste Management Permit, issued and administered by the Commonwealth of Kentucky, and the HSWA Permit, issued and administered by the U.S. EPA. These permits were issued on July 16, 1991, and constitute the RCRA Permits for PGDP. EPA's HSWA Permit is limited to the HSWA provisions of RCRA including corrective action requirements for SWMUs. The Kentucky Hazardous Waste Management Permit contains regulatory provisions for treatment, storage, and disposal (TSD) units permitted under the RCRA Base Program (pre-HSWA). The Commonwealth's Permit also contains corrective action provisions requiring corrective action for SWMUs. While Kentucky has been authorized by EPA to exclusively administer the RCRA Base Program for permitted TSD units, they have not received authorization to administer the HSWA provisions in lieu of EPA, thereby resulting in dual permit requirements for corrective action under both state and federal law. The RCRA Permits currently contain a Schedule of Compliance specifying timetables for DOE to conduct a series of RCRA facility investigations (RFIs) for SWMUs.

Administrative Consent Order. In July 1988, groundwater samples collected from residential wells north of PGDP indicated TCE and Tc-99 contamination. In November of 1988, the U.S. DOE and EPA entered into an ACO under Sections 104 and 106 of CERCLA. The primary purpose of the ACO was to formalize requirements for determining the nature and extent of off-site contamination and to ensure appropriate actions are taken to mitigate any immediate risks that may be posed to human health and the environment. To date, a series of site investigations and interim actions have been initiated under the ACO.

insert figure 3-2-1

Federal Facility Agreement. On May 31, 1994, PGDP was placed on the NPL. The NPL is a list of sites across the nation that have been designated by EPA as high priority for site remediation under CERCLA. EPA uses the Hazardous Ranking System (HRS) to determine which sites should be included on the NPL. A site is eligible for the NPL if it ranks 28.5 on the HRS; PGDP ranked 56.9. Being placed on the NPL means that DOE must follow the cleanup requirements of CERCLA. Section 120 of CERCLA requires federal facilities listed on the NPL to enter into an Interagency Agreement (also referred to as an FFA) with EPA. The purpose of the FFA is to provide a set of comprehensive requirements for remediation of DOE's PGDP. Because the FFA is intended to serve as the primary framework for site remediation under CERCLA, the Parties of the FFA (DOE, EPA, KDEP) have agreed to terminate the ACO, once the FFA is signed, since those activities can easily be continued under the FFA process. To the contrary, the RCRA Permits cannot be as easily terminated. In addition to the corrective action requirements, these Permits also contain requirements for permitted TSD units not directly associated with site remediation.

RCRA-permitted facilities listed on the NPL are subject to both CERCLA remedial action (RA) and RCRA corrective action authorities. This overlapping authority is most common at federal facilities, such as the case of PGDP. While the CERCLA RA and RCRA Corrective Action Programs may have similar objectives, the procedural requirements under the two statutes may differ to some degree. In the case of federal facilities, the FFA will typically contain provisions to coordinate the cleanup process of RCRA and CERCLA into a set of comprehensive requirements for site remediation, thereby eliminating duplication of effort and the inefficiencies that may result from having two separate cleanup programs operating independently at the same site (see **Figure 2.1**).

Clean Water Act Permit. The purpose of the CWA is to protect human health and the environment through regulating pollutant discharges into surface water from municipal, industrial, and other specific and nonspecific sources. The Commonwealth of Kentucky has been authorized by the EPA to administer the CWA in lieu of federal administration. At PGDP, the CWA regulations are applied through a state Kentucky Pollutant Discharge Elimination System (KPDES) Permit that regulates effluent discharges to Big and Little Bayou Creeks.

Agreements in Principle. An AIP was executed between DOE and the Commonwealth of Kentucky in May 1991 to formalize the arrangement between the two parties as it pertains to cleanup of the PGDP site. Under the AIP, which remains in effect for five years, DOE formulates and implements plan for waste minimization, source reduction, and waste characterization. Collaterally, Kentucky's Natural Resources and Environmental Protection Cabinet (NREPC) and the Cabinet for Human Resources (CHR) will monitor DOE performance and compliance with applicable federal, state, and local requirements, and consistency with Kentucky Revised Statutes Chapter 224, et al. Kentucky has also agreed to integrate PGDP into its Emergency Response Program, and to coordinate various state programs (e.g., public awareness) with PGDP remediation activities.

Under the AIP, DOE provides technical and financial support for designated activities, and Kentucky is responsible for distributing such funds. The two parties maintain effective working relationships and exchange periodic reports and data to insure close integration and appropriate funding management; DOE will comply with Secretary of Energy Notice No. 7 (SEN-7A-90), *Policy on Line Management's Responsibility to Achieve Environmental Compliance* in regards to reporting progress to Kentucky on DOE items. The AIP is currently under renegotiation.

Uranium Enrichment Toxic Substances Control Act Federal Facilities Compliance Agreement. The UE TSCA FFCA is a compliance agreement between EPA and DOE-HQ. It covers PCB compliance issues at the Paducah and Portsmouth Gaseous Diffusion Plants and the

former Oak Ridge Gaseous Diffusion Plant, now named the K-25 Site. It became effective on February 20, 1992. The Paducah and Portsmouth portions of the agreement were signed by DOE-Nuclear Energy. This FFCA includes requirements, completion dates, and allowances which are intended to bring the plants into full compliance with TSCA and the EPA regulations on PCBs codified in 40 CFR 761. Areas covered in the agreement include the unauthorized use of PCBs in ventilation gaskets, electrical cable insulation, lubrication oil, and electrical potential devices and the unauthorized disposal (including spills) and storage of PCB wastes (including radioactive/PCB wastes and selected RCRA mixed/PCB wastes) at the facilities. Completion dates range from pre-1992 activities to ongoing maintenance and cleanup activities to final disposal of all PCB wastes by the year 2015.

3.3 CURRENT WASTE MANAGEMENT AND MATERIAL DISPOSITION ACTIVITIES

3.3.1 Waste Management Activities

The Paducah Waste Management Program directs the safe storage, treatment, and disposal of waste generated before July 1, 1993 (i.e., "legacy" wastes), and waste from current DOE projects. The primary objective of the program is to ensure that waste materials do not migrate into the environment. Waste managed under the program is divided into six categories: Low-level radioactive, hazardous, mixed, PCB and PCB contaminated, asbestos, and conventional sanitary waste. Five of the six categories are briefly discussed below:

Sanitary and Industrial Waste. The new contained landfill (C-746-U) will become operational September 30, 1996. By October 1996, waste below 30 pCi/g for uranium will be accepted at C-746-U landfill. No storage of solid waste is proposed on-site with the exception of legacy wastes identified for disposal at C-746-U landfill. Solid Sanitary/industrial wastes will be collected and transported the C-746-U contained landfill at the Paducah Site.

Hazardous Waste. All hazardous waste generated at the Paducah Site, including all wastes subject to RCRA regulation, is managed as mixed waste. The Paducah RCRA Part B Permit identifies the types of hazardous waste capable of being generated and stored at the Paducah Site. The on-site facilities available for treatment of liquid hazardous wastes at the Paducah Site are the C-400 activated carbon absorption unit, C-400-D Unit leased by LMUS and the northwest pump and treat facility. Hazardous waste is stored as mixed waste in four mixed waste storage facilities on-site. No hazardous wastes are disposed at the Paducah Site.

Low-Level Mixed Waste. Mixed wastes generated include liquids, solids, sludges, and soil contaminated with hazardous waste. The types of wastes that will be accepted for mixed waste storage at Paducah are identified in the RCRA Part B Permit. The PGDP Site Treatment Plan (STP) outlines plans and schedules for treatment of mixed wastes. Liquid mixed waste treatment at the K-25 TSCA Incinerator totaled approximately 716,000 pounds for FY 1995. Approximately 1090 cubic meters of mixed waste are inventoried and stored at PGDP. Waste storage facilities consist of four RCRA permitted units. A fifth storage facility will be operational by August 1996 and will provide approximately 900 cubic meters of additional mixed waste storage space. No mixed waste is currently being disposed on-site. Plans are currently under way to ship mixed waste to Envirocare of Utah, Inc., for disposal.

PCBs/TSCA Waste. All PCB waste generated at Paducah is managed as radioactive waste unless verified to be nonradioactive. Currently, only potential surface contaminated waste can be surveyed and verified to be nonradioactive by DOE approved procedures. An on-site facility available for treatment of

wastewater containing PCBs is the C-400 Activated Carbon Adsorption Unit. Approximately 3600 cubic meters of PCB waste is stored at several storage units. These storage facilities are modified portions of uranium enrichment buildings, warehouses and new constructed facilities. The newest facility is C-753-A, which provides approximately 1885 cubic meters of storage space. No PCB wastes are disposed at the Paducah site, except treated wastewater as allowed under the KPDES Permit.

Low-Level Radioactive Waste. Low-level wastes generated at Paducah are primarily uranium-contaminated materials. All solid low-level waste generated is placed in storage. Liquid low-level waste is placed in storage to await on-site treatment. No solid low-level waste is treated on-site. Liquid low-level waste (i.e., wastewater) may be treated on-site at the lime precipitation unit. PGDP low-level waste storage facilities consist of modified portions of uranium enrichment process buildings, warehouses, and the use of outside storage areas. Approximately 5700 cubic meters of low-level waste are stored on-site. Additional low-level waste storage space will be provided due to the construction of the new ER waste storage facility. No low-level waste is disposed at PGDP. Future disposal for low-level radioactive waste generated at Paducah will be provided by off-site facilities or at central disposal facilities to be developed for Paducah.

Waste Certification for Off-Site Releases for Disposal/Treatment. In the Spring of 1991, DOE-HQ issued a moratorium on the off-site shipments of RCRA-hazardous and TSCA-defined PCB wastes until DOE-approved procedures could be implemented by the sites for the certification of wastes to meet the DOE performance objectives for off-site releases.

In June 1995, the DOE Paducah Site Office received a partial lifting of the moratorium from DOE-HQ/EM-30. The partial lifting allowed PGDP to pursue shipments of RCRA and TSCA wastes to commercial vendors which had potential only for surface radioactive contamination. The DOE approval requiring that PGDP certify these wastes met the surface release portion of the DOE performance objective for off-site release. The volumetric portion of the "no rad added" criteria could be met by process knowledge for sealed or closed containers. PGDP is currently pursuing the second part of the waste certification package which will address certification of wastes which have a potential for volumetric or internal radioactive contamination. This package is intended to provide a program which enables PGDP to certify that the waste to be shipped meets the waste acceptance criteria of the commercial vendor and the Nuclear Regulatory Commission or the host state.

Toxicity Characteristic Leaching Procedure Federal Facility Compliance Agreement. On March 26, 1992, EPA, Region IV and the DOE PGDP enterend into a TCLP FFCA concerning the status of certain accumulated wastes at the plant. The FFCA required PGDP to identify those solid waste streams that were not being managed in RCRA-regulated units and that had not been characterized under the then recently promulgated toxicity characteristic rule (40 CFR 261.24). Additionally, the FFCA required PGDP to provide a schedule for characterization of the program wastes by TCLP. In response to the FFCA, PGDP submitted an implementation plan to EPA that established a framework for compliance with the requirements of the FFCA. EPA has formally accepted PGDP's implementation plan.

Land Disposal Restriction Federal Facility Complicance Agreement/Federal Facility Compliance Act. On June 30, 1992, EPA and the DOE PGDP entered into an LDR FFCA. The LDR FFCA required PGDP to develop a final plan setting forth treatment technologies for wastes without existing treatment technologies. The FFCAct was effective in October 1993. The PGDP DOE is required by Section 3021(b) of RCRA, as amended by the FFCAct, to prepare Site Treatment Plans describing the development of treament capacitites and technologies for treating mixed wastes, defined by the FFCAct as waste containing both a hazardous waste subject to RCRA and a source special nuclear or by-product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.). During October

1995, PGDP entered into an Implementation Order issued by the Commonwealth of Kentucky which requires treatment of all mixed wastes within specific timelines and at specific locations.

Waste Minimization/Pollution Prevention (WMPP). The WMPP Program at the Paducah site provides guidance and objectives for minimizing solid waste generation for disposal and discharges to the environment via air and water. Guidance for the program comes from regulations promulgated by RCRA, the Pollution Prevention Act, applicable state and EPA rules, and DOE and executive orders.

Although the Paducah WMPP Program is in its infancy, the program is striving to meet its goals with the following strategy:

- source reduction,
- recycling,
- treatment, and
- disposal.

The WMPP Program has the following objectives:

- identifying WMPP reduction opportunities,
- establishing WMPP divisional goals,
- establishing employee awareness of WMPP,
- initiating WMPP projects,
- identifying WMPP responsibilities and resource requirements, and
- tracking and reporting WMPP results.

The WMPP Program is administered by a Waste Minimization Program Manager. Recordkeeping and reporting information is obtained through the Waste Management Department, which is part of EM and Enrichment Facilities.

In conjunction with the EM Department and the WM Department, the Waste Minimization Program manager identifies waste streams that are high-priority minimization or reduction candidates based on the following factors:

- availability of storage space,
- waste stream hazard,
- availability of treatment and disposal facilities (both on- and off-site),
- regulatory compliance issues, and
- management and disposal costs.

Following identification and prioritization of projects, the project listing is divided into two categories: projects that can be accomplished with existing resources and those that require additional resources. A project

team is established for each individual project. Project teams include members from the responsible organizations when necessary.

Waste Generation Forecasting. Continual changes in the scope and schedules for remedial action and decontamination and decommissioning activities have required that an integrated data base system be developed that can be easily revised to keep pace with changes and provide appropriate tabular and graphical output. The output can then be analyzed and used to drive planning assumptions for treatment, storage, and disposal facilities. **Tables 3-3-1** through **3-3-4** include solid waste generation estimates,

current solid waste storage capacity, ER waste forecast by project (FY 1996), and the DOE off-site shipment schedule.

insert table 3-3-1

insert table 3-3-2

insert tables 3-3-3 and 3-3-4

3.3.2 Material Disposition Activities

EM and Enrichment Facilities ER, D&D, and Waste Management organizations are stewards of significant material and equipment resources for DOE. There are situations when equipment and materials may be considered excess or surplus to meeting the goals of the organization. These situations include the completion of projects, resource requirements for operations or programs are met, facilities and associated equipment are no longer needed to fulfill a mission, or equipment that has reached the end of its reliability per DOE standards. It is the intent of these organizations to make surplus equipment and materials available for reuse within the government complex excess the property and recover its remaining asset from outside/commercial entities via property sales. Sites within the DOE complex have established surplus materials management programs. Similarly, PGDP has initiated actions to develop a formalized program at the site. In addition to recovering the asset of the surplus equipment or material, this program also results in minimizing waste from the facility.

3.4 OTHER ESSENTIAL ACTIVITIES

3.4.1 Public Participation

CERCLA actions, through requirements stated in the National Contingency Plan, involve full public involvement during the selection of remedies and the maintenance of an administrative record for all projects. A solid commitment has been made by DOE-Paducah Site Office and contractor management to inform and involve the public in work planning and management decision making, and this commitment is integral to the EM and Enrichment Facilities Program's management approach. Formal community relations planning and outreach are viewed by management as vital to the Project's success and an opportunity for excellence. The PGDP Community Relations Program for ER addresses public concerns by providing channels of communication between technical experts and the public and providing methods for addressing issues that arise. Administrative record files open to the public have been established in Paducah.

The Public Participation Plan and Community Relations Plan are currently being updated. These plans document the community relations history and issues of community concern and also describes the techniques and procedures to address those concerns. The plans incorporate community involvement into the process by developing mechanisms to allow nonconfidential information on the site restoration work to be made readily available to the public. This information includes, but is not limited to, monthly reports provided to the EPA and the state, news releases, notification of extensions and other changes to schedules and summaries of major activities, and public meeting and hearing records. The plans include mechanisms to enhance public access to information.

3.4.2 Program Management

EM Program management activities include:

- Quality Assurance--All DOE contractors participating in EM Program activities are required to prepare Quality Program Plans that prescribe responsibilities and activities for their organizations' implementation of Order 5700.6C and obtain approval from DOE. All EM Program projects must be
  evaluated to determine the need for a QA Project Plan. All sampling and analysis activities for

  CERCLA, RCRA and D&D projects must have a QA Project Plan that follows the latest EPA guidelines.

- General Management--The management strategy is to manage the program in accordance with best management practices, seeking to reduce costs and accelerate schedules with no degradation in technical performance, safety, health, or quality.
- Baseline Environmental Management Report--Mandated by the National Defense Authorization Act of 1994, provides the annual report of the activities and potential costs required to address the waste, contamination and surplus nuclear facilities that are the responsibility of the DOE's EM Program.
- Baseline Change Control--consists of an established baseline, maintaining the baseline, and revisions through the Baseline Change Control (BCP).
- Progress Tracking System--tracks program activities, accomplishments, and resources on a monthly basis.
- Cost Estimating--develop estimates by utilizing RACER and AES.
- Scheduling--accomplished by utilizing an open plan with monthly updates to ensure compliance with regulatory deliverables.
- Reporting--Performance measurements are updated monthly through the Management Control Information System (MCIS).
- Procedures--Site specific procedures are issued and updated on as-requested basis. Procedures from other systems are also used to direct performance of this work.
- Assessments--Paducah site environmental management programs are overseen by several organizations, both outside and within the DOE complex. Each year, numerous appraisals, audits and surveillances of various aspects of the environmental compliance program are conducted.

3.4.3 Support Programs

Support programs include cross-cutting technical and regulatory issues, such as:

- National Resource Damage Assessment (NRDA)
- Analytical Services Organization--contracts laboratories that meet NRC license requirements if PGDP's laboratory cannot meet needs.
- PGDP Laboratory--Runs analyses and handles sample management.
- EIMS--transfers data electronically to the EPA, as required by the HSWA Permit and the FFA and will be the primary mechanism for sharing data with the Commonwealth of Kentucky to satisfy the agreement outlined by the AIP.
- Groundwater--The Groundwater Program technically integrates all groundwater related acitivities, provides high quality, long-term monitoring services, and identifies and demonstrates more efficient, cost-effective monitoring, characterization, and remediation methods.
- Prioritization--Site priorities are to mitigate imminent threats, control hot spots as they are discovered, and address source units followed by final actions for groundwater and surface water. In 1994, the EM Program developed and implemented the ERBAM.
- Kentucky Agreement in Principle--DOE formulates and implements plan for waste minimization, source reduction, and waste characterization while, collaterally, Kentucky's Natural Resources and Environmental Protection Cabinet (NREPC) and the Cabinet for Human Resources (CHR) will monitor DOE performance and compliance with applicable federal, state, and local requirements, and consistency with Kentucky Revised Statutes Chapter 224, et al.
- Document Management--PGDP LMES DMC maintains record copy documentation for EM & Enrichment Facilities.
- Adminstrative Record--Provides documents for the public administrative record and maintains original collection.
- Regulatory Compliance--Review project documentation and participates on project teams to ensure compliance with all applicable regulations.

3.4.4 Surveillance and Maintenance

Ongoing S&M activities are conducted for all EM Program facilities including remedial action sites, support facilities, and decontamination and decommissioning facilities. These activities include:

- Surveillance and Inspections(S&I)--S&I is conducted to assess conditions at facilities versus desired criteria or requirements specified by post remedial operation and maintenance plans. Deficiencies are reported as required and corrected accordingly.
- Maintenance--Maintenance is conducted at ER support facilities and D&D buildings to prevent failures or problems and correct deficiencies observed during inspections. Support facilities must be maintained in ready condition for the intended use, i.e. decon pads, field laboratories. D&D facilities are maintained to assure containment of residual radioactive and hazardous contamination.
- Post-Remediation Monitoring and Maintenance--Sites that have been remediated may require long-term routine surveillance and maintenance of associated remedial equipment such as lift stations or landfill caps. Specific requirements are defined in operation and maintenance plans.
- Facility Stabilization--Special stabilization projects are implemented at D&D facilities to correct unresolved conditions in shutdown facilities or make improvements. These projects are implemented to reduce cost associated with S&M of the facility or reduce risk from contamination/conditions.
- Facility Management--Facility managers provided day-to-day direction of activities at RA sites, ER support facilities, and D&D facilities. This function provides adequate access control to facilities, assures surveillance and maintenance activities are conducted to meet requirements, and manage budget and planning activities associated with EM Program S&M.

3.4.5 Landlord

DOE's Uranium Programs is the Landlord for PGDP. Each year, all programs supported by the PGDP landlord provide planned budget requests based on prioritization. Landlord activities include such things as security, fire protection, emergency management, waste management, corrective actions, general plant maintenance, roads and grounds, etc., of DOE retained property and facilities.

3.4.6 Technology

Finding innovative environmental restoration and waste management technologies or modifying existing techniques to solve environmental problems is a priority at PGDP. Work is under way in the following areas:

- characterization and monitoring--developing advanced models, field measurement and sensing methods, and data acquisition and analysis systems for determining and mapping the contents of a waste site, and for monitoring the effectiveness and permanence of restoration activities;
- treatability--developing methods to treat waste and soils that are contaminated with hazardous compounds and low-level radioactive substances;
- technology transfer--promoting the transfer of technologies developed at the Oak Ridge Reservation that potentially could improve program effectiveness, reduce costs, and save time for federal agencies, industry, academia and the international community.

Technology projects and partnerships involved include:

Table 3-4-6

Technology Project	Partners	Additional Partners
Iron Filings Treatment Technology	EM-40/50	General Electric University of Arizona
Surfactant Injection Characterization Demonstration	EM-40/50	INETRA, Inc.
Vortec Demonstration	EM-40/50	Vortec Corporation
LASAGNA Demonstration	EM-40/50	Monsanto Corporation
Collodial Borescope	EM-40	

3.4.7 PAAA

Implementation planning for two PAAA rules, Quality Assurance and Radiation Protection, has been completed. Implementation planning for the additional rules is on hold until formal issuance of the rules.

4. INSTALLATION RELATIVE RISKS

An analysis was performed to detemine how the RDS scoring system would convert using the Primer criteria. The eventual outcome of the process assigned a score of H(high), M(medium), or L(low) for each release site. The Primer uses three evaluation factors for risk: Source Hazard Factor, the Pathway Factor and the Receptor Factor. Each of these three factors is given a rating (Significant, Moderate, or Minimal) for each medium (groundwater, surface water and sediments, soils, and buildings). For each release site, ratings are combined to place the site in an overall category of High, Medium, or Low. The RDS system has three categories of risk: Public Health, Site Personnel Safety, and Environmental Protection. Each risk category in the RDS system is evaluated using similar criteria in the Primer, i.e., the toxicity of the contaminants, whether pathways are available, and if receptors are exposed to contaminants.

In order to use the RDS data for MAPs, each of the three risk categories from the RDS matrix were assigned a score of High, Medium, or Low using the Primer criteria. An example is provided below. In the RDS process, a score of 1A for Public Health would be interpreted using the Primer criteria as follows: the toxicity of the contaminants is high (i.e., the Source Hazard Factor is significant--score of H), the migration pathway is evident (i.e., and pathway exists--score of H), and the receptor factor is identified (i.e., a receptor exists that can be exposed--score of H). A score of 1A in the RDS system would receive a score of H for MAPs. This process of assigning an H, M, or L was done for each alpha numeric sequence for the three RDS risk categories. Because the RDS system includes a time element, it was assumed in the comparison that a pathway was always available (i.e., the migration pathway was always given the desigination H), but that the contamination had not yet reached the receptor. In order to account for the time element in the MAP system, the receptor factor was considered to be potential is a score of B was used for time in the RDS system. A receptor factor of limited was assigned if a score of C was designated for time in the RDS system.

The RDS system itself assigns an H, M, or L to each alpha numeric score for each category. After the above task was completed, the resulting comparison of the Primer criteria matched exactly to the RDS

system designation of H, M, and L; therefore, the RDS H., M, and L designations were directly crosswalked for each of the three risk categories. The exercise outlined above provides backup documentation for the direct crosswalk of RDS scores to MAPs. Because there were three risk categories, a method was developed to "average" the three scores. A weighted average, the same one used for each of the three risk categories for the RDS system for ORO was used to determine a single score for use in MAPs. The Public Health category was given a weighting of 46 percent, whereas the Site Personnel Safety and Environmental Protection were given weights of 27 percent.

5. ENVIRONMENTAL RESTORATION STRATEGY

As was briefly explained in Chapter 1, the complexity of the EM Program demands a structured management approach (**Figure 1-3**). The Paducah management approach begins with a strategic plan. The strategic plan defines the EM mission, vision, objectives, priorities, and challenges. The cleanup strategy identifies the release sites, endpoints, problems, and approach needed to meet the vision, mission, and objectives. Next, the projects needed to solve the problems are identified, defined, and prioritized. When the prioritized list of projects is matched to available funds, a funding profile is developed that defines what work will be accomplished and when it will be accomplished. The projects are then executed, and the results are compared with the desired vision, mission, objectives, and endpoints. This feedback loop facilitates the identification of needed changes in projects and prioritization or the need for solutions to problems that arise. The following strategy takes in to account the eight program priorities as outlined in the ER Strategic Plan.

The sections below explain the key assumptions, strategy for remedy selection, installation-wide strategy, regulatory strategy, compliance strategy, and strategy for performance measures. Major assumptions for Vision 2010 follow the table.

5.1 KEY ASSUMPTIONS

Table 5-1-1 includes current Key Assumptions for the cleanup activities which are divided into technical, cost, and schedule categories.

The following key assumptions relate specifically to Vision 2010 and may already be included above but are re-emphasized below.

- Major Assumptions for Vision 2010

  - Future land use for DOE property will remain mixed industrial/recreational, with cleanup standards being protective of:
    - industrial workers inside security fence/buffer zone.
    - recreational receptors on DOE property but outside security fence/industrial buffer zone.
    - residential receptors at the DOE property boundary.

  - Deed restrictions will be imposed on DOE property to prevent future residential use and consumption of contaminated groundwater and, to the extent practical, all parties agree to jointly pursue administrative measures on adjacent properties to control use of contaminated groundwater.

Table 5-1-1. Key Assumptions.

SITE	ASSUMPTIONS		
	TECHNICAL	**COST**	**SCHEDULE**
PGDP	• Wastes will be disposed of at each site. • Buildings transferred to ER are decontaminated and either prepared for reuse or demolished and capped. • Contaminated groundwater will be pumped and treated as a last resort. • Source control rather than removal is the preferred remedial action approach. • Surveillance and maintenance will continue during the stabilization step. • All landfills will be capped, barrier walls installed and leachate collection will be initiated/continued. • All TCE spills sites will be remediated using in-situ vapor extraction. • All PCB sites will be excavated. • All lagoons will be remediated by sludge removal and capped. • USTs will be removed, area partially excavated and backfilled, except those at C-611 which are NFA and remain in place. • Scrapyards will be remediated through removal. • CERCLA/RCRA are the regulatory drivers for PGDP. • Risks shown are based on Risk Data Sheets. • ER will comply with requirements for Natural Resources Damage Assessments. • All requirements of the FFA will be met. • The requirements of PGDP Public Participation and Community Participation Plan will be fulfilled.	• The funding level will be consistent with meeting the requirements of applicable laws, permits, regulations, orders, and agreements. • Annual surveillance and monitoring costs were assumed to continue to be incurred after completion where restricted areas were assumed to remain.	• A facility will have ten years of surveillance and maintenance after the transfer of a facility to ER, followed by five years of stabilization activities, and maintenance before final disposition. • Complete groundwater containment projects by FY 1997. • Complete TCE source areas RODs by FY 2001. • Complete site surface water drainage by FY 2010. • Treat and dispose of all Paducah legacy waste by 2010. • Complete RCRA Closures of C-733, C-746-A and C-746-R Hazardous Waste Storage Facilities by 2006. • Complete ongoing infrastructure upgrades by 1997. • Generators fund management of newly generated waste by 2000.

Final actions for off-site groundwater plumes will include the following:
- continue to provide an alternate water supply to potentially affected residents.
- contain releases from on-site sources contributing to off-site groundwater contamination.
- mitigate the high concentration portion of the off-site groundwater plumes.
- maintain off-site monitor well network to monitor the migration of the plumes.

- demonstrate discharges to the Ohio River will not result in statistical decreases in surface water quality.

- In accordance with SMP priorities, conduct preliminary sampling at eight low-risk WAGS to support early identification of NFA candidates, thereby minimizing unnecessary RI/FS activities.

- Defer the RI/FS for one "high risk" WAG (WAG 24) until overlying scrap is removed.

- Adopt the federal TSCA PCB cleanup level of 25 ppm approved by EPA for industrial sites.

- Technical impracticability waviers for DNAPL remediation will be granted.

- D&D of PGDP facilities that have a low reuse potential will be post-Vision 2010 activities.

- Operating SWMUs (i.e., 13, 2, 12, 14, 8, 29, 30) will be investigated/ remediated upon ceasing plant operation--assumed to be post-Vision 2010. Any ongoing releases from these SWMUs will be stopped prior to ceasing plant operations based on risks posed by the release.

5.2 STRATEGY FOR REMEDY SELECTION

The strategy for remedy selection has been and will continue to be dominated by the requirements prescribed by CERCLA and RCRA. One of the purposes of the draft FFA is to integrate or coordinate the two programs, including remedy selection, at PGDP. A primary objective of the draft FFA is to implement remedies that reduce, control, or eliminate risks to human health and the environment. Certain data will be collected during the RI/FS Phase to support the following risk-related decisions:

1) Baseline risks and the need for further action;
2) Levels of constituents that can remain on-site and still be adequately protective of human health and the environment (Risk Management);
3) Comparison of human health and environmental benefits based on various remedial alternatives (Risk Assessment); and
4) Consistent process for evaluating and documenting current and future risks to public health and the environment at a site.

To support these decisions, various types of risk evaluations will be conducted during the cleanup process. These will include SRAs, intended to streamline the identification of conditions that warrant interim actions; Baseline Risk Assessments (BRAs), to support final actions at source units; and BRAs for Comprehensive Site Operable Units to collectively evaluate co-mingled contamination resulting from multisource releases.

DOE, in conjunction with the EPA, Region IV and KDEP, will then identify preferred alternatives and present them to the public in proposed plans for review and comment. DOE reviews the public comments and consults with the state and EPA to determine whether the alternatives remain the most appropriate remedial action for the site. The final remedy selection is documented in a ROD or ROD for an interim action.

5.2.1 Program Endpoints

CERCLA cleanup is risk-based in nature and requires that an NPL site, in this case PGDP, be remediated in a way that it does not pose an unacceptable risk to human health and the environment. Therefore, acceptable risk to human health and the environment must be defined so that the amount of

risk to be reduced through cleanup can be determined. Although PGDP also holds RCRA Permits, RCRA does allow for ACLs which accommodates risk based cleanup objectives. Before acceptable risk and the corresponding cleanup objectives can be defined, it is necessary to establish the end points of the ER Program.

These endpoints have been defined in terms of recommended land use-based human health and ecological risk and environmental standards or applicable, relevant and appropriate requirements (ARARs). Section 2.6 of the MAP document identifies the land use recommendations upon which human health and ecological risk assessments can be based and cleanup objectives determined. This integration takes into account not only new data being developed but also historical monitoring data. By integrating the monitoring of several SWMUs/AOCs, a better understanding of the impact of contamination can be gained, and overall monitoring and investigation costs can be reduced. This approach allows for a better appreciation of the impact and contribution to risk associated with larger areas. As a result, the WAG approach can provide a rational means of prioritizing investigative and remedial efforts on a smaller scale.

Information on WAGs is used to develop realistic remedial alternatives and controls to clean up SWMUs/AOCs within the WAG. Activities may include such actions as source removal, groundwater controls, or institutional controls as appropriate.

Projects will be based on activities required to achieve the desired endpoint(s) at a specific SWMU/AOC or WAG. Prioritization of the projects shall be conducted using the ER Benefit Assessment Matrix (ERBAM).

5.2.1.1 Land Use Endpoint

Project scoping involves the use of defined remedial action objectives that are based, in part, on the land uses selected for the project sites. To provide a consistent land use approach that accommodates the needs of all stakeholders responsible for the remediation and reutilization of PGDP, a reservation-wide strategy has been developed. Preferred land use options are driven by the stakeholders for PGDP, without consideration of current use/restriction, so that cleanup operations will be based on the most likely and acceptable land uses. DOE utilized the information gathered from interfaces with the stakeholders to recommend desired land uses for PGDP. The land uses recommended by DOE as a result are being used for planning land and facility use/reuse. DOE will revise the land use proposals on the reservation regularly to reflect recommended changes and new information. The land use recommendations form the basis for cleanups that are effective in terms of cost and risk management, while taking into account the preferences of the stakeholders.

5.2.1.2 Applicable or Relevant and Appropriate Requirement Endpoints

Remedial actions must comply with chemical-, action-, and location-specific ARARs as required by CERCLA Sect.121(d). These requirements may include identified cleanup levels for surface water and/or groundwater, application of specified cleanup technologies and waste management techniques; and other requirements depending on the SWMU/AOC, contaminants of concern, and specific actions to be taken. ARARs are based on technical requirements of regulatory programs other than CERCLA, such as the Clean Air Act, Clean Water Act, RCRA, TSCA, and others. The development and application of ARAR endpoints will be conducted for individual SWMUs/AOCs or WAGs as appropriate. These requirements will be developed and assessed as required by CERCLA in the RI/FS process and documented in decision documents.

5.2.2 Approach to Cleanup Strategy

The approach to implementing PGDP cleanup strategy must address the entire CERCLA/RCRA process from initial SWMU/AOC identification through final remediation and site control. Simply stated, the strategy of the EM Program is to accelerate the transition of a SWMU/AOC from characterization to remediation by making decisions at the WAG scale based on recommended land uses.

Not all SWMUs/AOCs at the site are subject to the remedial/corrective action process. **Table 3-1-1** identifies the regulatory status for each SWMU/AOC at the site, including SWMUs/AOCs that are subject to an RI/FS, SWMUs/AOCs that have been designated for no further action, and SWMUs/AOCs that are regulated under the Kentucky Hazardous Waste Permit as a permitted TSD unit. For the operating RCRA units, they will be scheduled for an RI/FS when the unit ceases operation. Accordingly, the SWMUs/AOCs associated with a building structure will be scheduled for an RI/Feasibility Study (FS) during D&D activities.

Complex sites with multiple environmental releases may choose to divide the site into smaller areas and conduct location-specific RI/FSs. These individual study areas (often referred to as WAGs) typically contain a limited number of SWMUs/AOCs grouped together based on certain criteria (reassignment of SWMUs/AOCs to other WAGs may occur as a result of new investigations or developments in technology).

PGDP currently contains numerous WAGs that are subject to the RA process. The site priorities as depicted in **Figure 5-3-1** are to mitigate imminent threats, control hot spots as they are discovered, and address source units followed by final actions for groundwater and surface water. Actions taken to date have primarily focused on imminent threats and hot spots associated with off-site contamination with minimal emphasis on the contributing sources. Containment of sources prevents ongoing releases to groundwater and surface water, thereby allowing cleanup of those media to be based on risk and cost-benefit analyses and technically feasible approaches. As work for the higher priority WAGs is completed or when additional resources become available, the lower priority WAGs will be addressed. With existing actions under way to address imminent risks and hot spots associated with off-site contamination, DOE is in the process of shifting program focus to on-site sources.

Once a WAG is prioritized and the corresponding RI/FS identifies a specific problem warranting action, a remedy is selected and implemented. The selection and implementation of remedial and removal actions, which are documented in the RODs and Action Memorandums, are referred to as OUs. OUs may address geographic portions of a site, specific site problems, or initial phases of an action; or they may consist of sets of actions performed over time. Appendix C contains the list of OUs that have been identified to date.

5.2.3 Observational Approach

Due to the high cost and/or technical impossibility of completely characterizing (e.g., type and exact amount of contaminants, location of contaminants, hydrogeology, etc.) a given ER project site, only limited characterization is performed as a part of the cleanup strategy. Logical assumptions about the site are made after sampling and reviewing available data (e.g., regarding what contaminants exist, their migration, etc.) in order to allow the project to proceed (e.g., establishment of a preferred cleanup approach and its design). As field activities progress, design requirements, designs, and remediation tools must adjust to new information. This approach to cleanup is commonly known as the observational approach.

insert fig 5-3-1

5.2.4 Streamlined Approach for Environmental Restoration

Specific remediations may be conducted under DOE's Streamlined Approach for ER (SAFER). SAFER recognizes that uncertainty will always be a factor in environmental restoration activities and must therefore be managed appropriately. Despite the effort to reduce uncertainty through careful sampling and analysis efforts, uncertainties will always exist about site conditions, cleanup technologies and potentially changing regulations. To rapidly and cost effectively reach cleanup decision, there must be a balance between reducing and managing uncertainty. SAFER strives to provide this balance through:

- Enhancing the focus on planning and scoping activities;
- Linking the collection of data directly to decision-making data needs;
- Recognizing and managing uncertainty;
- "Learning as you go" as planning and remediation activities proceed and applying what you learn;
- Focusing early on likely remedies; and
- Assuring participation from key stakeholders.

SAFER encourages project staff to use data that is already available for the site in order to focus the RI data needed to make cleanup decisions and to be able to rapidly complete the FS. By doing so, cleanup activities can be accelerated.

5.3 INSTALLATION-WIDE ENVIRONMENTAL RESTORATION STRATEGY

The cleanup of PGDP involves a step-by-step progression of environmental restoration activities from initial identification of areas with environmental concerns through final cleanup and use of the area for its end use. The elements of the cleanup of PGDP are 1) project identification; 2) project definition; 3) prioritization; and 4) funding profile. Because the land use recommendations have been developed recently, in some cases project assumptions (i.e., scope, schedule) associated with existing and planned projects have not yet been revised to reflect the approach and recommendations. The assumptions are being revised for consistency.

5.3.1 Project Identification

A series of projects have been identified to characterize and remediate the Reservation. These projects address all SWMUs/AOCs listed in the RCRA Permits and draft FFA.

The ER Program defines a project as all steps necessary to cleanup an area under the RCRA Permits and draft FFA and ensure effectiveness of any remedial action through operation and maintenance activities. For example, a project could include an RI/FS, development of a proposed plan, establishment of a ROD, and remedial design/remedial action (**Figure 5-3-2**). Projects at PGDP are developed by considering one or more SWMUs/AOCs as individual study areas (often referred to as WAGs). WAGs typically contain a limited number of SWMUs/AOCs grouped together based on certain criteria (reassignment of SWMUs/AOCs to other WAGs may occur as a result of new investigations or developments in technology).

- Common Remedial Technologies
- Common Geographic Locations
- Common Release Mechanisms
- Common Media Type
- Operating Units
- Common Contaminant Sites
- Common Operational Processes
- Common Surface Water Drainage
  - Hydraulically-Connected Areas
- Suspected Sources of Off-site Contamination

insert Figure 5-3-2

5.3.1.1 SWMU/AOC Identification

Additional SWMUs/AOCs may be discovered while conducting CERCLA/RCRA investigations and response actions. This occurrence is most likely in areas where heavy industrial, research, and/or waste disposal has occurred. When potential areas are discovered during CERCLA/RCRA activities, the areas will be evaluated to determine whether CERCLA/RCRA activities are required and, if necessary, incorporated into the list of SWMUs/AOCs.

In the current regulatory environment, almost all activities associated with the management of hazardous materials, hazardous wastes or solid wastes, require notification or other regulatory controls. Often these requirements include environmental monitoring of groundwater and/or discharges to surface water. These monitoring efforts, at times, identify contaminants from areas upgradient or upstream from the unit or discharge being monitored. When this occurs, additional investigations are conducted to determine contaminant sources that may identify new SWMUs/AOCs.

Regulated units such as those operating under RCRA and TSCA have specific closure/cleanup requirements that must be met. In some cases cleanup or closure under these programs are technology-based rather than risk-based. When this occurs at an NPL site, it may cause the unit to be identified as an SWMU/AOC and the final action at the unit to be taken under CERCLA. To ensure that activities conducted at a unit/AOC will also meet the requirements of CERCLA, an integrated action is taken. This approach is being used at Paducah to ensure that RCRA closures will also be consistent with CERCLA remediation goals.

As is the case with other government or industrial plants that have been in operation for several decades, a multitude of different activities have taken place over time, requiring changes in materials, process, equipment, and facilities. Government operations on the Reservation started more than 40 years ago in the early 1950s. During this time, not only have physical changes occurred, but the work force has also turned over several times. When these elements are combined with the general restriction of process knowledge for security reasons, the result is that no individual or group of individuals have complete information regarding all PGDP past operations or all potential release areas. For these reasons, it is expected that the EM Program will occasionally receive information that indicates that other releases have or may have occurred from a variety of organizations or individuals. When potential release information is received, the EM Program will evaluate the areas to determine whether CERCLA activities or corrective action under RCRA is required and, if necessary, incorporate the areas into the list of SWMUs/AOCs.

5.3.2 Definition of Projects

During the project definition stage of the process, the scope of each project is assumed based on available information and the use of key schedule assumptions included in Section 5.1, and a schedule and cost estimate are prepared for the assumed scope. Remedial decisions are not made at this time; remedial assumptions are made for planning purposes. Schedules and assumptions may be modified.

Project definition is an iterative process that involves identifying the environmental problems, the potential solutions to these problems, the steps required to achieve the selected solution(s), and the information needed to accomplish each step. To make this process useful, it must be performed based on reasonable assumptions made at a specific time using available information. The process is iterative because it must be reviewed/revised periodically to reflect new information. Once a project has been identified and approved by appropriate personnel such as representatives from DOE, the Commonwealth of Kentucky and EPA, the project may be designated either a remedial or removal process. The outcome of the project definition process is a set of activities (for which estimated costs and schedules have been

developed) that are required to resolve environmental problems associated with each project to meet the endpoints (i.e., land use and ARARs).

Project definition activities utilize data to determine the feasibility of applying potential solutions for cleanup. This provides a basis for ranking solutions using risk and development of baselines to establish realistic assumptions for cleanup. These assumptions include identified future land use, utilization or development of alternative technologies, waste treatment/disposal options, and methodologies for complying with regulatory requirements.

The scheduling of work initially includes the application of a Generic WAG Schedule to support long-term planning and outyear budget projections. (The Generic WAG Schedule was approved by EPA and KDWM on January 19, 1995 and January 24, 1995, respectively.)

As the time frame for implementation of an RI/FS for a given WAG approaches, a project-specific schedule based on detailed scoping activities will be developed to replace the Generic WAG Schedule. The project-specific schedules will be proposed to EPA and KDWM in the appropriate primary documents. The RI/FS Work Plan will contain the project-specific schedule for work activities conducted through remedy selection. The ROD will contain a schedule for completing the remedial design and submitting the corresponding RD Report. The RD Report (90 Percent Design) will contain the project-specific schedule for completing remedial construction and submitting the corresponding RA Report.

Once all of the individual projects are defined, they can be combined into one list of projects that comprises the current life-cycle of the ER Program to clean up PGDP. This project list is used in the prioritization process.

5.3.3 Prioritization

Because of the large number of SWMUs/AOCs on the Reservation and the finite resources available to address these areas, a method of prioritizing the projects based on risk has been implemented. In 1994, the ER Program developed and implemented the Environmental Restoration Benefit Assessment Matrix (ERBAM) (Dail, Nanstad, and White 1995) to aid in prioritization of its list of projects. The ERBAM provides a framework for 1) organizing information about identified environmental problems, 2) generating qualitative assessments of the long- and short-term risks posed by these environmental problems, and 3) evaluating the benefits associated with projects designed to reduce those risks. Prioritization is conducted to rank (or score) projects on the basis of the overall risk-benefit value (e.g., risk reduction) they provide.

The ERBAM includes a set of impact categories and selection criteria. The impact criteria balance the major objectives within the EM Program. These objectives are protection of public health, protection of on-site workers, protection of the environment, reduction of off-site contamination, containment of contamination, reduction of landlord and surveillance and maintenance costs, release of facilities and land for public beneficial use, making prudent investment decisions, maintenance of the essential infrastructure, and reduction of uncertainty through characterization.

To reduce the degree of bias inherent in a qualitative process, an objective decision-making body (the ER Prioritization Board) responsible for prioritization of work packages has been established. The ER Prioritization Board, comprised of DOE and Energy Systems ER Program managers and representatives from regulatory agencies, scores the projects and determines the final prioritization of the list of projects. This becomes the prioritization list as depicted in **Table 5-3-3**. The projects are prioritized based on human health protection, environmental protection, site worker protection, stakeholder preference, mission, and cost effectiveness. The ER Program risk-based prioritization

methodology is utilized on at least an annual basis to support the development of ER Program budget requests. **Table 5-3-4** depicts the site priorities utilizing the ERBAM ranking and the current schedule at Paducah pursuant to Modification No. 10 to the RCRA Permit.

insert table 5-3-3

Table 5-3-4. Site Priorities.		
Site Priority	**Project**	**Remedial Construction Completion Date**
Immediate Risks (Complete)	PGDP Residents Water	Complete
	PGDP Well Sampling	
Control "Hot Spots" Associated with Off-Site Contamination	Ditch 011/012 ICM	12/96
	NW Plume IRA #1	
	NE Plume IRA #1	
	N-S Diversion Ditch	
	Institutional Controls--SW	
	Sediment Controls--Scrapyards	
Suspected Source of Off-Site Contamination	WAG 22 (2&3)	Year 2008
	WAGs 1&7	
	WAG 23	
	WAG 22 (7&30)	
	WAG 17	
	WAG 6	
	WAG 27	
	WAG 28	
	WAG 3	
	WAG 24 (RI/FS)	
Suspected Sources of On-Site Contamination	WAG 15	Year 2013
	WAG 11	
	WAG 9	
	WAG 19	
	WAG 16	
	WAG 5	
	WAG 21	
	WAG 20	
	WAG 13	
	WAG 2	
	WAG 12	
	WAG 14	
	WAG 8	
	WAG 29	
	WAG 30	
Integrator Units (GW/SW)	WAG 25	Year 2015
	WAG 18	
	WAG 26	

5.4 NON-ENVIRONMENTAL RESTORATION REGULATORY STRATEGY

The most significant acitivity which affects the EM Program at Paducah is the Gaseous Diffusion Plant activities themselves. Currently, USEC leases the production facilities. Several WAGs are comprised of SWMUs/AOCs which are actually still in operation. Therefore, investigation and remediation, if necessary, cannot move forward until operations at PGDP involving these SWMUs/AOCs cease. Upon the shutdown of operations, environmental restoration of the site can be completed.

The PGDP Uranium Hexafluoride Cylinder Program is directed toward improving the safety and reliability of long-term storage of 31,000 DOE-owned cylinders. The baseline inspection of all cylinders was completed in 1993; about 25 percent of the cylinders will continue to be inspected each year so that all cylinders are inspected every four years. The program which is managed by the DOE Uranium Enrichment Program (EF-20) is currently in the process of upgrading and developing new storage yards. The cylinder yards are also part of a cylinder surveillance program which consists of inspections, ultrasonic testing and radiological surveys. Several cylinder storage yards are located on or within SWMUs/ AOCs which may hinder investigation and/or remediation of these areas.

Another significant activity which needs to occur so that environmental restoration of the site may proceed is the recovery of scrap metal. Several SWMUs/AOCs are located beneath scrapyards. Complete remediation of these sites will not be possible until the scrap is removed. To complicate matters, some of the scrap is considered to be classified. The Paducah site is involved in a Scrap Metal Recovery Program.

5.5 RESTORATION-RELATED COMPLIANCE STRATEGY

5.5.1 Public Participation

Community involvement is vital to DOE's EM Program. Public input, required by law, ensures that communities and people affected by past environmental practices will have a role in selecting remedies for the problem. The Paducah Community Relations Program provides a way for DOE and members of surrounding communities to communicate. Such communication allows DOE to remain up-to-date on the changing needs and attitudes of the communities, to identify emerging issues and concerns, and to more readily involve citizens in making decisions.

Citizens affected by environmental problems at the U.S. Department of Energy's (DOE) PGDP have expressed a need for timely information, clear summaries of technical documents about environmental cleanup activities, and a point of contact from whom they can obtain more information. They are concerned that unresolved and unexplained environmental issues could affect their property values as well as tarnish the community's reputation. DOE's Community Relations Program addresses those concerns by providing channels of communication between technical experts and the public and methods for addressing issues that arise.

The goal of DOE's Paducah Community Relations Program is to keep area residents informed of and involved in activities and decisions that affect them. The following program objectives are designed to meet this goal:

- Inform the public about planned and ongoing environmental actions.

- DOE is committed to making technical information understandable and accessible. Information is provided at meetings and is readily available to the public at DOE's Environmental Information Center, located at LMES in Kevil, Kentucky. The Center houses the Administrative Record, which contains all information on which decisions about environmental cleanup are based. A variety of informational materials is available such as fact sheets, DOE's community newsletter, and related news articles.

- Encourage and assist the public in providing input on technical decisions.

- Federal environmental law requires public comment on proposed cleanup plans, and such public input will have a direct bearing on decisions that are made. Citizens can discuss environmental problems with technical experts at public meetings, small discussion groups, open houses, and workshops. In one-on-one meetings with technical and community relations staff, residents can discuss results of environmental studies and proposed cleanup efforts that directly affect them.

- DOE issues news releases about upcoming events and announces opportunities for public comment on all key program documents or proposed cleanup plans in area newspapers.

- Focus and Resolve Conflict

- DOE's Community Relations Program provides a means by which differences of opinion may be resolved. The program allows for constructive criticism that may lead to more sound decision making.

5.5.2 Program Management

The program management strategy is to manage the program in accordance with best management practices, seeking to reduce costs and accelerate schedules with no degradation in technical performance, safety, health, or quality.

5.5.2.1 Quality Assurance

DOE 5700.6C "Quality Assurance" establishes the DOE requirements for the ER Program. All DOE contractors participating in ER Program activities are required to prepare Quality Program Plans that describe responsibilities and activities for their organizations' implementation of this Order and obtain approval from DOE. All ER projects must be evaluated to determine the need for a QA Project Plan. All sampling and analysis activities for CERCLA, RCRA and D&D projects must have a QA Project Plan that follows the latest EPA guidelines.

5.5.2.2 Integration

The integrating contractor shall also be responsible for coordination between site programs and the EM Program, sharing project-specific lessons learned, and technology integration.

5.5.2.2.1 Lessons Learned

A lessons-learned system has been established. A lesson learned is an experience, example, observation, or insight that constitutes a "good work practice" or identifies, defines, and eliminates a

problem. Lessons learned impart significant, beneficial knowledge to project personnel.

Lessons learned are shared amongst projects and prior experiences are incorporated into the decision process. Lessons learned address quality, safety, management, design, estimating engineering, construction, inspection, testing, start-up, and any other system or function that may benefit from earlier knowledge.

Management and administrative procedures provide for proper attention to these areas and ensure that lessons learned are submitted to the appropriate managers.

Project employees are obligated to present lessons learned. Whenever a process is improved to the degree that the originator or the originator's management deems it significant, or a particularly effective solution is found to a common problem, the persons involved should document the success as a lesson learned. Lessons learned can originate from a variety of sources including industrial experience, audits, self-assessments, DOE information, and other sources. Lessons learned must be presented for the following conditions:

1. The dissemination of information derived from lessons learned which has project interest and could possibly require corrective action or preventive action; and
2. The issuance of information that describes any experience or issue (internal or external) that has potentially major environmental, safety, health, or quality implications and requires actions from multiple managers and supporting personnel. The information will be disseminated immediately and rapidly through ORO and contractors.

A lessons-learned coordinator has been established. The lessons-learned coordinator is responsible for verifying that a lesson learned does not contain classified information and to obtain sign-off by an Authorized Derivative Classifier and Unclassified Controlled Nuclear Information (UCNI) coordinator. Each lesson learned is drafted by the originator and submitted to the lessons-learned coordinator. Forms are prepared for submittal of lessons learned. Subject matter validators evaluate an experience, example, observation, insight, or generic problem to determine its applicability to other projects, organizations, or personnel. Lessons learned are submitted to the appropriate subject matter validators by the lessons-learned coordinator. Valid lessons learned have an "alert" status assigned by the lessons-learned coordinator, based on the conditions above. The lessons-learned coordinator distributes the lesson learned with the appropriate alert condition.

The correction of the condition that led to the lesson learned is critical in avoiding recurrences of the same or similar incident. The lessons-learned coordinator oversees the resolution and implementation of all lessons.

Lessons learned are recorded and identified and an approved solution determined before embarking on preventive measures to avoid future recurrences. The corrective measures are determined using root cause analysis techniques.

By carefully following a logical decision tree approach, one can determine the root cause of the lesson. Once this determination has been made, the casual factor or document can be revised, thereby avoiding similar occurrences.

All documents affected by the lesson learned are revised accordingly in order to prevent recurrences of conditions that led to the root cause of the lesson learned. All baseline documents are revised through the configuration management process. Before issuing approved revised documents, a lessons-learned notification is issued to all holders of the root cause documents, informing them of the

lesson learned and the corrective action. This notification is inserted into the causal document until the revision containing the corrected sections or pages is issued. To ensure that affected documents are properly revised, an action item is assigned to the responsible manager.

The lessons-learned coordinator is responsible for printing and placing placards identifying lessons learned in various locations in the project workspace on a monthly basis to serve as a visual reminder of previous problems that have been resolved through management action.

In addition, the lessons-learned coordinator attends DOE monthly review meetings to ensure that common lessons learned are communicated across projects. A written lessons-learned summary is distributed at every monthly meeting. In addition, the lessons-learned coordinator develops and maintains a data base of the lessons learned for the ER Program.

5.5.2.2.2 Technology Integration

Technical consistency will be achieved among EM Program participants in areas such as risk assessment, NEPA compliance, and waste management activities.

5.5.2.3 Baseline (Environmental Management Report)

The Baseline Environmental Management Report (BEMR), mandated by the National Defense Authorization Act of 1994, provides the annual report of the activities and potential costs required to address the waste contamination and surplus nuclear facilities that are the responsibility of the DOE Environmental Management Program (EM). The report contains descriptions of activities, assumptions, cost estimates, and schedules for the life cycle of the EM Program as well as some analysis of that information.. The BEMR provides the summary information found in the report concerning the “Base Case” as well as an illustration of how costs vary when assumptions are changed in four major areas: land use, scheduling, funding and activity pace, and technology development and waste management configuration. It also presents the site-specific data used to generate the High Base Case in the report. Excluded from the estimates are restorations where no feasible cleanup technology exists (e.g., most contaminated groundwater); total cleanup of currently active facilities; and activities during the first five years of the EM Program. In order for DOE Headquarters to prepare the report, raw data is obtained by DOE field personnel from existing information sources and anticipated environmental management strategies for their sites. This information is tempered by general assumptions and guidance developed by DOE Headquarters personnel. This data is then integrated by DOE Headquarters personnel and modified to ensure that overall constraints such as funding and waste management capacity were addressed. This information is the foundation for the Base Case estimate. The data is also entered into various modeling tools and integrated to produce a range of estimates based on varying assumptions. Requirements for the BEMR are listed in the Oak Ridge Operations Office, a Baseline Environmental Management Report, Management Plan.

5.5.2.4 Progress Tracking System (PTS)

DOE-ORO requires that all contractor reporting be in accordance with established policies. The Cost Performance Report (CPR) and the Progress Tracking System (PTS) are the vehicles used to accumulate and report cost and schedule performance data for the EM Program and shall be provided on a monthly basis. Copies of each contractor’s Cost Performance Reports and PTS reports shall be provided to Energy Systems for integration of the actual cost and performance data from each contractor

to provide integrated reports for DOE-ORO. Status reports containing funding information will also be issued to track budget authority/budget outlay, commitments, and accrued cost. Progress, accomplishments, problems, impacts, and corrective actions shall be reported on a periodic basis, as specified in the Reporting Requirements Checklist that is negotiated between the ER Program participants and DOE-ORO. Special instructions shall be included on the Reporting Requirements Checklist to identify any supplemental information required, such as the month through which cost data are accrued and reported. The Milestone Schedule Status Report is the vehicle used to reflect status for all prime participants. The format and content of these progress reports are to be coordinated with DOE-ORO and defined in lower-tier plans and procedures. The ER Program monthly PTS reporting schedule shows the information that needs to be provided to the Energy Systems by ***all participants*** and when this information needs to be provided. The PTS tracks progress data for costs, milestone/schedule, and technical parameters, including baseline tracking data for each project. Energy Systems consolidates the data and issues monthly reports covering this information to DOE-ORO.

5.5.3 Support Programs

The strategy for the support programs is to identify and resolve programmatic issues and to ensure consistency in approach amongst projects.

5.5.4 Surveillence and Maintenance

The ER Program is committed to reducing S&M-related costs.

5.5.5 Landlord

Landlord activities are the responsibility of both USEC and DOE Uranium Enrichment Organization. This responsibility will continue until the shutdown of operation, when it will transfer to ER.

5.5.6 Technology

The technology strategy is to make use of existing, proven technologies first. Only when existing technologies are insufficient will projects employ more advanced, less proven approaches.

5.5.7 DOE Orders

As more and more EM projects are incentivized, it is the intent of the EM Program to conduct work in compliance with federal and state laws and industry codes and standards, in place of DOE Orders. Only when industrial codes and standards alone would provide an inadequate level of ES&H protection will requirements from DOE Orders be included in project requirements baselines.

5.5.8 PAAA

The Paducah ER Program will participate in the promulgation of PAAA rules and will work to ensure that legally-required implementation plans that are developed reflect the unique needs of the EM Program. Compliance with applicable rules and implementation plans will be factored into project/facility planning and operations. Needed assessments will be integrated within the existing self assessment program and non-compliances will be handled in accordance with the noncompliance reporting system.

Efforts are underway on ER nuclear facilities that will result in those facilities nuclear hazard

categorization being reduced from Category 2 to Category 3 or from Category 3 to radiological, thus lessening the compliance burden and associated costs of PAAA on ER-managed facilities.

5.5.9 Systems Engineering

Systems engineering encompasses management of the engineering and technical effort required to transform a project's objectives into an acceptable end-state, such as a remediated site or an operational system. It includes the engineering required to define the cleanup system performance parameters and the configuration to best satisfy the project objectives. It also includes the planning and control of technical tasks, integration of the engineering specialties, and the management of a totally integrated design effort to meet cost, schedule, and technical objectives of the systems engineering process.

Systems engineering tasks performed for a particular project are identified and planned by that project's team. The systems engineering process is a proven, disciplined approach for moving from a defined mission, such as cleanup of a contaminated site, to a set of finished products and/or activities that performs/satisfies that mission. In the systems engineering process, the mission is analyzed to determine the top-level requirements for the finished product and/or activity. The top-level requirements are analyzed and refined to derive requirements that are then allocated to lower-level products (such as regulator-required plans) and/or activities. Design efforts should begin only after the design requirements are clearly established. Once a preliminary design is proposed, it should be evaluated against its requirements. Integration of the mission requirements and the design solution is achieved by a multi-disciplinary team through iterative analysis of the requirements versus the proposed design. The systems engineering process considers all aspects of system requirements from the earliest stages of design through development, testing, and implementation. The systems engineering process supports the development of a consistent baseline upon which the project management process can be imposed.

Systems engineering is used on all appropriate EM Program cleanup projects. It is applied using a graded approach, where the level of systems engineering necessary is tailored to the importance and/or complexity of the project or activity. Contractors are required to conduct systems engineering planning for their efforts. The formality used and level of documentation required in applying systems engineering is tailored in accordance with the level of complexity of the project. Complex projects require a high level of formal documentation. Low-complexity projects may require much less in terms of formal documentation and receive a level of attention commensurate with the cost, risk, or potential hazards associated therewith.

The systems engineering management process is controlled by adherence to a Systems Engineering Management Plan (SEMP) which has the following characteristics:

- It is prepared and maintained at the contractor or project level by non-DOE organizations contributing to the engineering efforts.
- It includes a discussion of how the various systems engineering management elements will be utilized and controlled during projects. These elements include planning, presentation of design concepts, technical requirements definition, controls, and analysis.

On a selected basis, non-DOE organizations that contribute to each project's engineering effort prepares and maintains a SEMP that shows how that organization's systems engineering efforts will be integrated with the project's systems engineering efforts. DOE-ORO decides which contractors must prepare and maintain an SEMP based upon complexity, risk, and/or potential hazards of the covered activities.

Three interrelated and interdependent categories or activities which comprise the systems

engineering approach to project management are as follows:

- Technical planning and control.
  - Technical planning and control consists of the management and control of the technical components of a project through the use of a WBS, configuration management, technical reviews, and other techniques related to systems engineering.

- Project implementation.
  - The systems engineering process is a sequence of activities and decisions which transforms an identified mission need into an effective and timely cleanup solution that satisfies DOE-ORO's needs. The objective of the systems engineering process is to ensure that the system and its elements satisfy functional requirements, operate effectively in the intended environment, and demonstrate a level of performance and reliability that justifies the investment of resources used to achieve those objectives.

- Integration of technical (engineering) specialty activities.
  - Technical specialty integration consists of the timely and appropriate integration of engineering-related activities and disciplines. These specialty activities include systems safety engineering; environmental, safety, and health; RAM; human-factors engineering; logistics support and maintenance; quality assurance; safeguards and security; and training. The results of analyses and studies by these specialties are combined, using systems engineering, into a set of non-conflicting requirements that permit the overall mission requirements to be met in an effective manner.

5.5.10 Readiness Review

Readiness reviews will be focused on ensuring mission success in a cost-effective manner by limiting review scope to that necessary for ensuring that project planning has been adequate to ensure technical success before significant project phases commence.

5.5.11 Configuration Management

The objective of the Configuration Management Program is to establish consistency among requirements, physical/functional configuration, and documentation (e.g., drawings, procedures), and to maintain this consistency using defined change control and document control processes, particularly as changes are made.

The benefits of having consistency among requirements, physical/functional configuration, and documentation include increased safety and efficiency of EM Program work. Effective implementation of the elements and functions of the Configuration Management Program provides the tools and information necessary for integrating and coordinating activities to ensure that work is done correctly and safely—the first time. The cumulative benefits of a Configuration Management Program include increased safety and reliability, improved environmental protection, and a reduced potential for unscheduled shutdowns.

The configuration management approach to be used is based on DOE-ORO's recently approved and issued "Environmental Restoration and Waste Management Configuration Management Guidance Document," DOE/ORO/01-1272&D0, Revision 0, October 1994.

5.5.12 Improved Project Definition

With limited funding for EM activities and a strong DOE and contractor management

commitment to using taxpayer-provided funds wisely and involving the public in planning and decision making, restoration planning and execution strives to deliver optimal solutions for cleanup projects. Risk reduction and cost are balanced and selected cleanup alternatives are further analyzed to eliminate unnecessary and costly performance features through the use of value management. A key feature of applying value management is the application of function analysis which is a part of the standard five-phase job plan sanctioned by the Society of American Value Engineers. The VE methodology is utilized during the development of the feasibility study (or equivalent), and it may be appropriate to use it more than once on a project depending upon the project complexity. Project planning concepts from "The Environmental Management Project Manager's Handbook for Improved Project Definition" are being integrated into the Oak Ridge ER Program project planning process.

5.5.13 Contracting Initiatives

As a part of contract reform, the EM Program is turning its projects into incentive task orders. This consists of a teaming approach between DOE and its contractors, which representatives from each company involved in the project working under a lead project manager. For each task order, definitive goals are established upfront, roles and responsibilities are clearly defined, an incentive award is negotiated up front for safe, timely, and cost-effective completion. The potential exists for contractors to lose money if the project is not managed properly. Incentive contracting increases interest among bidders. With respect to project requirements, the task orders are structured to completed in compliance with federal and state laws, and industry codes and standards—not DOE Orders.

Each EM Program subcontractor is selected on the basis of competitive bidding and the appropriate and effective utilization of set-asides for 8(a) companies, small businesses, small disadvantaged businesses, and women and minority-owned businesses. The work to be performed is under the daily guidance and direction of the awarding principal, either DOE or a DOE prime contractor. The Integrating Contractor has a functional subcontractor coordination center, in addition to a small business coordination function, in its procurement organization to ensure that their future subcontracts comply with this initiative.

5.5.14 Task Work Agreements

The Task Work Agreement (TWA) is used by DOE to authorize the Integrating Contractor (IC) to proceed with the scope defined in the TWA. TWAs may be submitted throughout the year based on key decision points or phases of projects. TWAs for level-of-effort activities are prepared on a fiscal year basis. The TWAs are used by DOE to provide a scope, schedule, and funding envelope to the IC. The IC is not authorized to spend beyond the limits of the TWA for each project and is subject to actual availability of funding. The IC is not allowed to move budget between projects without a revised TWA. The IC shall not perform work not authorized by the TWA.

The TWA is prepared based on the contractor-provided cost estimate and the projected funding authorization. TWAs will be revised when change approvals occur, or when the baselines stated in the TWAs are affected.

The IC shall establish and maintain a funds authorization system that interfaces with the TWA and accomplishes the following:

- authorizes expenditures of resources against baselines,
- prevents the expenditure of resources for work or procurement without approval at the appropriate level of management,
- terminates authority when funding limits or other limits of authority or constraints would be

exceeded, and
- prevents the expenditure of funds for unauthorized work or procurement.

TWAs are the performance portion of the project baseline. The performance baseline is established by the TWA. Work which cannot be defined in a TWA, due to incomplete information, etc., is in the forecast baseline.

5.6 PERFORMANCE MEASURES

Strategic Measure 1. Relative Risk Reduction

PGDP will classify and track all release sites and facilities by relative risk to human health, the environment, and worker safety. Relative risk categories will be based on a simple high, medium, and low classification scheme. As program priorities are implemented and program goals are attained, there is an expectation that higher relative risk release sites and facilities will either move to a lower risk classification or into the "no further action" category. Similarly, the general trending of medium and low relative risk sites should be moved toward the no further action category.

Strategic Measure 2. Lands and Facilities Status

PGDP will track trending patterns in both land and facilities status with regard to the remediation of lands and decommissioning of facilities so that they are ready to be transferred for future beneficial use.

Strategic Measure 3. Resource Distribution

PGDP will track overall trending in the distribution of funds committed to core activities, assessment activities (including determination of no further action), and remediation progress. The desired trend would show a steady decline in the assessment and core activities fraction, and a corresponding increase in the cleanup progress fraction.

Strategic Measure 4. Program Efficiency

Cost-effectiveness and efficiency will be achieved through reductions in infrastructure costs, elimination of unnecessary management and oversight costs, and utilization of cost-effectiveness technologies. PGDP is working, in conjunction with other DOE offices, to develop methods for measuring program cost-effectiveness and efficiency. These measures will be used to quantify overall program performance.

6. ENVIRONMENTAL RESTORATION PROGRAM MASTER SCHEDULE

6.1 SITE ENVIRONMENTAL RESTORATION MASTER SCHEDULE

Current Level 1 milestones pursuant to the SMP strategy are included in **Table 6-1-1**. As Paducah

moves into the Vision 2010 strategy, these milestones will be updated as needed.

A Master Environmental Restoration Schedule based on the current Modification No. 10 to the RCRA Permit and full compliance funding is included as **Table 6-1-2**. Also included are key schedule assumptions **(Figure 6-1-1)** and a generic WAG schedule **(Figure 6-1-2)** which has been approved by EPA and KDWM. Additional key assumptions are included in Section 5.1 of this document. In addition, a generic WAG schedule, not yet approved, but which takes into account the objectives of Vision 2010 is included as **Figure 6-1-3**. One of the main differences between the two generic WAG schedules is the Vision 2010 eliminates a two-phased investigation.

Table 6-1-1. Current SMP Level I.

CURRENT SMP LEVEL I	
Immediate threats	Complete
Complete Remedial Construction for Hot Spots associated with Off-site Contamination	FY1997Q1
Complete RODs on High Risk Source Sites except for WAG 24	FY2003Q3
Complete No Further Action Determinations for Low-Risk Sites	FY2010Q2
Complete all Remedial Construction	FY2015Q3

6.2 COMPLIANCE SCHEDULES AND MILESTONES

A compliance schedule was included in Modification No. 10 to the Kentucky Hazardous Waste Management Permit KY8-890-008-982. This schedule becomes effective April 4, 1996. An identical compliance schedule has been submitted as Modification No. 5 to the HSWA Permit to EPA. The previous compliance schedule was modified to include the new WAG structure and prioritization agreed upon by EPA, the Commonwealth of Kentucky, and DOE. Included as **Table 6-2-1** is the schedule for submission of the D1 RI/FS Work Plan. As Paducah moves into Vision 2010, a new schedule based on Vision 2010 will have to be submitted as part of a modification to the RCRA/HSWA Permits.

Also included as **Figures 6-2-1** and **6-2-2** are summaries of current compliance milestones for ER and WM. **Figures 6-2-3** and **6-2-4** are preliminary compliance milestones for ER and WM utilizing Vision 2010. These milestones and schedules are based on full funding. Once the FFA is signed by all Parties, FY through FY+2 deliverables will be negotiated and included in the MAP and as an appendix to the FFA.

insert master schedule

insert key assumptions

key assumptions

insert generic WAG schedule

generic WAG schedule

generic WAG schedule

Mod #10

mod#10

insert summaries

insert summaries

insert summaries

insert summaries

insert summaries

er V2010

wm V2010

7. ISSUES AND INITIATIVES

7.1 ISSUES TO BE RESOLVED

Primary issues that need to be resolved for the Paducah EM Program to be successful. These are as follows:

- Kentucky Agreements in Principle

  The Kentucky Oversight Agreement expires May 13, 1996. Two needed actions are to resolve various issues, including support for regulatory programs and to negotiate renewal of the Kentucky AIP. The Commonwealth of Kentucky is drafting a new agreement using the guidance (model language) provided by HQ, but has yet to submit it to DOE. An extension to the grant period is being discussed in case the final agreement is not received by the current expiration date. Quarterly meetings are being held between DOE and the Commonwealth of Kentucky in an effort to identify and resolve issues. The support for regulatory programs is being addressed by negotiating an FFA grant.

- FFA

  The PGDP FFA has yet to be signed. Prioritization/funding/enforceable commitments, dispute resolution, removal actions, stipulated penalties, comprehensive site-wide operable units are the main issues yet to be resolved. Negotiations are ongoing with a signed FFA expected in FY1996.

- Declassification of Gaseous Diffusion Technology

  At DOE's request, LMES is looking at the incremental costs of scrap metal recovery in the D&D Program if GDP technology remains classified. All estimates now assume the technology will be declassified; however, that is not a current reality. The task is to associate incremental costs of D&D and associated scrap metal recovery if GDP remains classified. This task relates to K-25, Y-12, and will, at some point, include the GDP operations at Paducah and Portsmouth. Declassification could bring cost benefits to D&D and reindustrialization--including commercialization. Markets may exist for commercialization of inorganic membrane technology.

- Land-use Planning

  The future use of selected property at PGDP will have a significant impact on the cleanup standards, types of RAs and total costs for site remediation. For example, remediation for industrial areas may differ significantly from actions taken for residential areas. Therefore, the proper development of land use assumptions are critical to implementing an efficient, cost-effective program protective of human health and the environment. Existing lease agreements and site contamination will have a major impact on future land use decisions. In addition to existing lease agreements and site contamination, input from both internal and external stakeholders has been considered. In general, the majority of the stakeholders supported a continued industrial/commercial presence at the site that would preserve existing jobs and continue to contribute to the regional economy. No stakeholders recommended converting DOE property to residential use. While DOE has obtained preliminary input from various stakeholders, PGDP is currently in the process of establishing a SSAB to review issues and

provide input on environmental matters at PGDP. Land use will also be discussed with the SSAB once it is operational. DOE will continue working with stakeholders regarding this issue. DOE considers the current land use of mixed industrial/recreational as the most likely future use scenario for the site.

- DNFSB

  DOE is responding to a recommendation from the DNFSB regarding the Enrichment Facilities Program, specifically, the Depleted Uranium Hexafluoride Cylinder Program. The recommendation included improvements in storage and long-term management of the depleted uranium hexafluoride cylinders.

- Documentation Agreement

  The numerous planning documents that are currently required to be prepared and maintained make it difficult, if not impossible, to maintain consistency among them. For example, keeping the BEMR, Risk Data Sheets, project lists, ADSs, funding, and the MAP consistent is made difficult since each is prepared at a different time of the year under different financial scenarios and changing regulatory agreements.

- Streamlining

  DOE, EPA and the Commonwealth of Kentucky are working and will continue to work to streamline documentation required by CERCLA and RCRA. The elimination of unnecessary documents and the combination of appropriate documents and use of programmatic plans will reduce cost and review time.

- Point of Exposure/Point of Compliance

  Risk-based cleanup standards will be established for each contaminated media (e.g., soils, groundwater). The process will involve the use of various exposure assumptions to develop clean-up standards protective of human health and the environment. When establishing such standards for groundwater, a point is typically designated downgradient of a source as the location where a potential receptor is assumed to come in contact with the contaminated groundwater. This POE is commonly referred to as the POC under RCRA. DOE is proposing an alternate POC that involves expansion of the waste management area to encompass multiple units. The majority of the units which are located within the security fence will be considered one large waste management area enclosed by a primary POC. Secondary POCs for those units outside the security fence, such as those in WAG 17, will be designated on a case-by-case basis. As previously mentioned, these POCs will serve as the location under the risk assessment where a potential receptor is assumed to come in contact with groundwater. However, it should be noted that DOE does not use any groundwater under PGDP for drinking purposes or plant operations. Additionally, local residents located downgradient of DOE property have been provided municipal water and do not use groundwater as a drinking water source. Therefore, the proposed POC/POE is not expected to increase current risks to human health and the environment.

- Alternate Concentration Levels

  Current regulations under both RCRA and CERCLA provide for moving the POE downgradient from the POC depicted in **Figure 3.5** . This process is typically accomplished through an ACL

petition or associated with a ROD. The petition or ROD must be approved by EPA and Kentucky and demonstrate that the proposed POE would be protective of human health and the environment. Under such a demonstration, CERCLA provides flexibility for establishing a POE at 1) the DOE property boundary, or 2) the Ohio River. If a POE is established beyond the property boundary (i.e., Ohio River), CERCLA 121(d)(2)(B)(ii) requires compliance with the following three conditions:

1) there are known and projected points of entry of such groundwater into surface water;
2) no significant increase of constituents from groundwater to surface water; and
3) the RA includes enforceable measures that will preclude human exposure to contaminated groundwater at any point between the facility boundary and all known and projected points of entry of such groundwater into surface water.

Establishing a POE at the DOE property boundary, or to a greater extent, the Ohio River, would result in significant cost reductions for site remediation. However, under either option, DOE must demonstrate adequate protection to human health and the environment.

- Technical Impracticability

  At PGDP, TCE, which is a DNAPL, has been released to the environment and migrated downward to the groundwater forming high concentration pools, thereby serving as long-term sources of groundwater contamination. EPA guidance (OSWER Directive 9234.2-25) published October 4, 1993, discusses the technical impracticability associated with DNAPL remediation. In such cases, 40 CFR 300.430(f)(1)(ii)(C)(3) contains provisions for obtaining ARAR waivers based on technical impracticability. These waivers are typically documented in a ROD or other formal agreements.

  In such cases, TI zones for DNAPL contamination would be established exempting DOE from cleanup standards for that particular location. However, since the TI wavier is based on current remedial limitations, new technology developments would be monitored closely for future use. The applicability of TI waivers at PGDP will be evaluated upon discovery of such zones and will be considered during future remedial decisions on a case-by-case basis.

- Cleanup Levels for PCBs/PCBs in Outfalls

  DOE has received a verbal commitment from the Commonwealth of Kentucky accepting cleanup level for PCBs of 25 ppm. Kentucky is requesting in addition to the 25 ppm cleanup level that additional controls on risks be performed to ensure that the risks stay at the 10^{-6} order. DOE has not agreed to additonal controls. PCB levels in the outfall ditches are still being negotiated and no agreement has been reached to date.

  The Paducah EM Program is an exceptionally difficult challenge. Unlike sites like Weldon Springs, Fernald, or Rocky Flats, the Oak Ridge ER Program is confronted with conducting cleanup at active sites in areas with ongoing operations managed by non-EM-40 landlords. The desires of EM must be balanced with those of other residents. As an example, the EM Program does not have the ability to mandate what will happen with respect to land use; actions must be negotiated with many parties.

7.2 IMPROVEMENT INITIATIVES

The EM Program has a clear vision for completing the EM-40 mission, with a Plan and the team to meet the challenge. Continuous improvement is a cornerstone commitment of management. Evidence of that commitment is embodied by the following initiatives.

- Improve Up-front Project Planning

  As indicated by the Principal Deputy Assistant Secretary for Environmental Management, Richard J. Guimond, in his letter dated February 2, 1995, ER projects, when compared to similar projects in the private and public sectors, take longer to complete and cost more. Poor project definition was identified as a major contributor to this lackluster performance. Because of this information and an ensuing stand down meeting of senior managers, the "Environmental Management Project Manager's Handbook for Improved Project Definition" was created to help remedy this situation. A prominent and primary tool endorsed and explained in that Handbook is value engineering (VE).

  To help improve up-front project planning, in July 1995 LMES ER issued the "Value Engineering Guidance Document," ES/ER/TM-150, to explain how the VE methodologies can be applied to the various phases of ER projects to improve that the right project is defined right. The VE methodology can be used to improve and/or plan many things, both physical (hard) systems and administrative (soft) systems. The duration of VE studies typically varies from one to five days and can be longer for large, complex projects. The minimum return on investment for VE analyses is 1,000 percent . This means that a $20,000 VE analysis typically will identify $200,000 or more in cost savings, assuming a project of sufficient size. Usually, the savings are much greater.

- Do more for less

  The EM Program is committed to increasing productivity by doing more work for less money. A key S&M goal is to reduce the base S&M costs (cost/acre). Examples of activities planned to reduce this base mortgage cost include removing combustible materials; reducing fire protection requirements, surveillance, and active systems; reducing utility requirements and costs; moving occupants out of buildings; removing hazards that drive ES&H requirements; consolidating fissile materials; integrating and reducing surveillance scope and frequencies; decontaminating areas to reduce personnel protective equipment costs, and applying necessary and sufficient standards to the operations.

  ES&H and quality assurance achievements have also contributed significantly to lower the cost of operations by reducing noncompliances (which result in fines) and by maintaining a safe work environment.

- Optimize Execution

  The EM Program is committed to using incentive contracting to lower government costs and relate contractor fee to risk and performance. These incentive contracts typically are structured around contractor teaming arrangements that use the best of niche contractors with specialized and proven skills and abilities. Furthermore, the EM Program has already prequalified twenty eight 8(a) contractors in eleven niche areas to help support this incentive approach.

  The EM Program is also working hard to streamlining requirements that projects must comply with. In accordance with DOE Headquarter's "necessary and sufficient" guidance, the baseline set

of requirements that projects must comply with can be reduced to federal and state laws and commonly accepted industry codes and standards. This will lower the costs of projects by eliminating many non-value-added DOE Order requirements.

- Performance Measures

The EM Program is committed to measuring performance against predefined benchmarks consistent with the DOE Headquarters ER Strategic Plan to show: the number of release sites (by relative risk ranking) over time; the funding spent to reduce the relative risk, the acreage of contaminated property cleaned up over time, the number of facilities cleaned up over time, the funding distribution (dollars spent on remediation, assessment, and core program) over time, and business indicators (funding spent on program management and infrastructure over time).